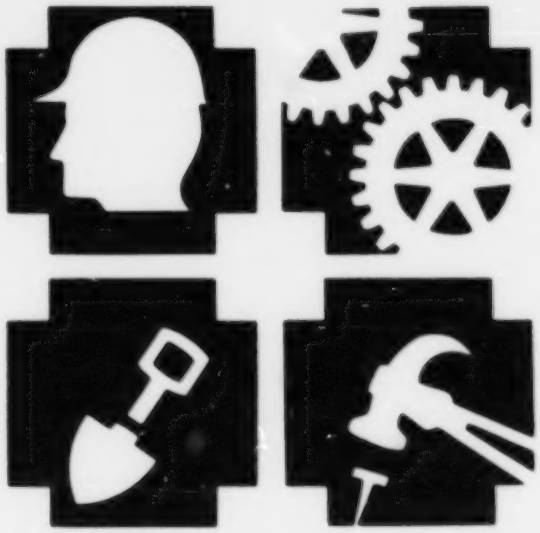
Strategic Planning Branch **REPORT**

Know Your City

The Edmonton Labour Market

1989 - 1993



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THE CITY OF Edmonton PLANNING AND DEVELOPMENT

RESEARCH PAPER NO. 32

The Edmonton Labour Market 1989 - 1993

Important Note: This technical paper was prepared by the Forecasting and Policy Development Group, Strategic Planning Branch Planning and Development Department
It documents research results as part of an ongoing forecasting activity. Neither the methods nor the results have been endorsed by the City of Edmonton.

OCTOBER 1989

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Patrick Walters
September 30, 1989

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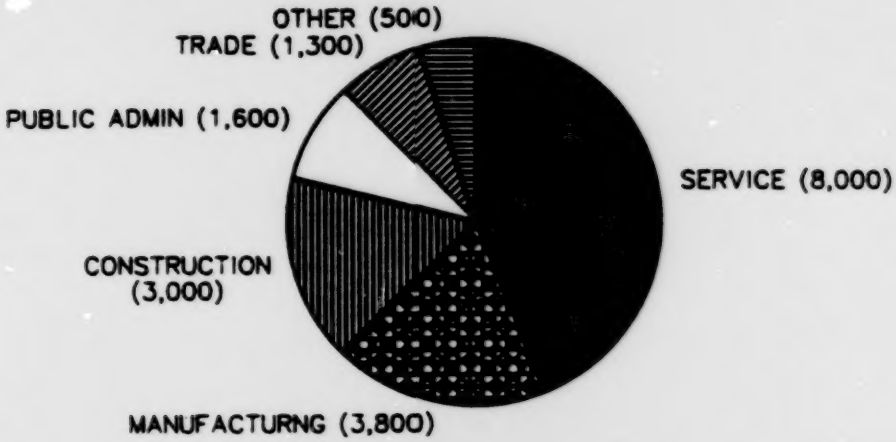
Figure E1

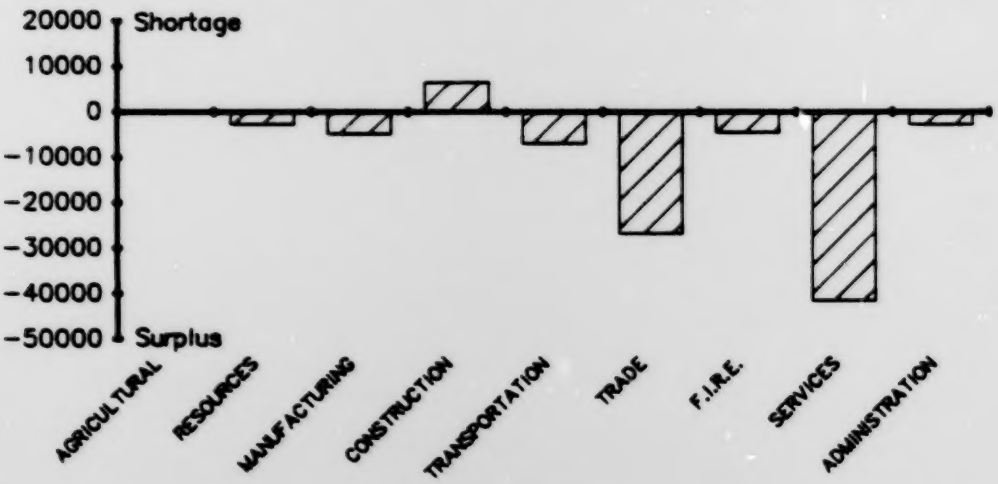
PROBABLE JOB GAINS: EDMONTON 1989–93



Source: The Planning and Development Department, August 1989.

Figure E2

LABOUR SHORTAGE AND SURPLUS: ALBERTA 1993



Source: The Planning and Development Department, August 1989.

EXECUTIVE SUMMARY

1. Purpose

The purposes of this report are as follows:

(i) to identify emerging trends that are impacting on the Edmonton labour market;

(ii) to project labour demand and supply by industry and occupation and identify potential shortages and surpluses over the 1989-1993 period; and

(iii) to develop a set of recommendations which address apparent imbalances in the labour market.

2. Labour Demand in Edmonton

The total labour demand in Edmonton is projected to grow from 368,200 jobs in 1989 to 386,400 jobs by 1993, with job gains expected to be concentrated in the following industries: (See Figure E1)

	Job Increase (1989-1993)
Service	8,000
Manufacturing	3,800
Construction	3,000
Public Administration	1,600
Trade	1,300

3. Labour Shortage and Surplus in Alberta

By comparing labour supply and labour demand projections for the 1989-1993 period, labour shortage or surplus becomes apparent in each industry at the provincial level.

Supply forecasts were only prepared at the provincial level because of data limitations and the assumption that supply conditions are similar across the Province. The construction industry is expected to experience labour shortages of 6,600 person years by 1993. All other industries are projected to have labour surpluses by 1993, but only a small surplus in resources, manufacturing and finance.

The labour supply in Alberta's construction industry is expected to exceed labour demand in 1989 but by the end of the forecast period labour surplus is forecasted to change to shortage (See Figure E2).

Unexpectedly strong economic performance may result in a shift from the small labour surplus in the resource, manufacturing and finance industries to labour shortage by 1993.

TABLE E1

Comparison of Changes in Alternative Labour Demand Projections: Alberta 1989-1993

Industry Division	Employment Most Probable (1)	COPS (2)	Conference Board (3)
Agriculture	1,000	2,600	(800)
Resources	(700)	400	(1,300)
Manufacturing	8,200	1,300	8,200
Construction	10,000	(700)	7,200
Transportation	500	(700)	13,100
Trade	4,300	4,500	30,200
Finance	1,500	0	6,200
Services	24,000	12,200	43,900
Public Administration	4,000	0	5,200
Total	56,200	19,200	111,900

Source: (1) Planning and Development Department, 1989
(2) Canadian Occupational Projection System (COPS), Canadian Employment and Immigration, January, 1989
(3) Conference Board of Canada, PC Alberta, Spring 1989

4. Uncertainty in Labour Demand and Supply

The choice of the specific labour demand forecast substantially determines the study results regarding labour shortages/surpluses.

Two alternative forecasts of labour demand in Alberta were examined; one was prepared for the Canadian Occupational Projection System (COPS) and the other by the Conference Board of Canada. Based on an assessment of prospects, a most probable labour demand forecast at the industry division level was made (see Table E1).

There are significant differences in the Alberta labour demand forecasts prepared by COPS and the Conference Board for manufacturing, construction, transportation, trade, finance services, and public administration. The two forecasts provide completely different pictures on the evolution of Alberta's labour markets.

The magnitude of the differences underscores the uncertainty of forecasting economic activity in Alberta and the need for regularly monitoring and updating of labour demand and supply forecasts to reduce the uncertainty.

5. Recommendations

- Data gathering and dissemination agencies should provide information on employment for Census Metropolitan Areas below the industry division level.

- Manpower surveys are necessary in those industries that are expected to experience labour shortages and the service industry; such surveys should meet the following objectives:

  (i) to examine the extent to which companies in Alberta are currently experiencing problems in hiring skilled workers to fill positions in major occupational categories;

  (ii) to assess how the labour market conditions will change over the next five years;

  (iii) to assess opportunities to mitigate skilled labour shortages through training programs.

1. INTRODUCTION

1.1 Purposes

The purposes of this report are to:

- identify emerging trends that are impacting on the Edmonton labour market;
- project labour demand(1) and supply(2) by industry and occupation and identify potential shortages and surpluses over the 1989 - 1993 period; and
- develop a set of recommendations which address apparent imbalances in the labour market.

1.2 Situational Overview

A number of significant forces are combining to transform the international environment. These developments are forcing local economies to undergo a constant process of labour market adjustment. The factors can be broadly defined as domestic and international.

Domestic

Economic development in Canada and its various regions has been determined by the region's ability to exploit external markets. This principle is still relevant for Alberta and Edmonton. For example, in the 1970's the province benefitted from the world's growing demand for raw materials and the resulting high economic rents. In the 1980's, glut replaced shortages in the world resource markets and as a consequence oil prices collapsed. In addition to the collapse of world oil prices, the stagnation in the 1980's was exacerbated by a number of factors(3):

- introduction of the National Energy Program and the Petroleum Gas Royalty Tax in 1982 brought about reduced profit margins and cash flow to Alberta based firms since these measures favoured development in the frontier lands. As a result, a significant decline in energy investment occurred in Alberta;
- high interest rates and high debt load served to curtail many investment projects;
- the cancellation of several heavy oil and tar sands projects(4) due to the fall in world oil prices and the above factors; and
- the federal government's maintenance of a fiscal surplus with Alberta beginning in 1981 (Economic Council of Canada 1984).

The Canadian economy recovered strongly in 1983 and has since experienced strong continuous economic growth. Alberta had a more tentative economic recovery, with strong growth in 1985 as energy investment increased and essentially no growth in 1986 as world oil prices collapsed. This slowdown was rather brief as the provincial economy experienced positive growth in 1987 and 1988 as a result of a combination of stimulative provincial fiscal policies and strong natural gas sales to the United States.

International

The above changes in the Alberta and Canadian economies occurred at a time when the world was experiencing a number of structural changes[5]:

- the deregulation and integration of global capital markets;
- the division of the world into major trading blocs;
- the merging of telecommunications and computer technology; and
- the rapid diffusion of technical knowledge from the advanced to the developing world.

The combination of structural change in the international economy and economic change in the domestic economy has resulted in the provincial labour market experiencing fundamental changes. The adjustment process in Alberta is characterized by a number of features:

- Employment in Edmonton between 1976 and 1981 grew from 278,000 jobs to 353,000 jobs or by 29%; from 1981 to 1988, employment crept up to 356,000 jobs or by 0.9%.
- The number of part-time employees in Alberta increased from 145,000 persons in 1981 to 184,000 persons by 1988; whereas, full time employment declined from 1,007,000 to 1,002,000 jobs over this period.
- Businesses with less than five employees were responsible for 55.3% of the net increase in jobs in Alberta between 1978 and 1984.

These changes present a set of opportunities and threats for Edmonton. For the City to realize its growth potential, it has to learn to adapt to its environment. History has shown that the successful regions are those that are best able to anticipate change and develop appropriate measures to correct deficiencies in the economic system.

The decision to initiate this project should be regarded as an attempt to provide some answers to these problems. In addition, the current study updates the report Occupational Labour Demand in the Edmonton Area 1988 - 1992 (1988) and analyzes the local labour market against the background of emerging labour market trends. The Planning and Development Department

provided research assistance in the preparation of the 1988 report and at that time indicated that it would be updating the forecasts.

1.3 Organization of Report

The report is organized as follows:

Section 1 - Introduction
Section 2 - Emerging Forces
Section 3 - Methodology for Forecasting Labour Demand
Section 4 - Labour Demand Forecast
Section 5 - Labour Supply and Demand Forecast
Section 6 - Issues
Section 7 - Conclusions and Recommendations

Section 2 analyzes the current labour market situation and identifies the trends that are shaping the labour market. Section 3 describes the methodology and the data sources that are used to forecast labour demand. In Sections 4 and 5 labour demand and supply forecasts are presented. Issues are identified in Section 6 and conclusions and recommendations are made in Section 7.

2. EMERGING FORCES

Edmonton's future employment situation will be shaped by a number of emerging forces. These trends are discernible from an analysis of recent economic history. This section of the report is devoted to a review of the current labour market situation. The objective of the review is to identify the threats and challenges that face the local economy. The following topics will be covered in this section: Part-time/full-time employment, growth of the service sector, job creation, the labour force and mining.

2.1 Part-time/Full-time Employment

Part-time employment's share of total employment in Alberta increased from 13.1% in 1976 to 15.5% in 1988. Data for the similar period is not available for Edmonton; however, the City accounts for roughly a third of the provincial labour force and as a result, it can be expected that it had a similar experience as that for the province.(6) Individuals are considered as working part-time if they work for less than 30 hours (or between 1 to 29 hours) in a given week.

Several factors have contributed to the growth of part-time employment in Canada over the 1976-1988 period:

a) Over the last several decades women have entered the labour force in large numbers, a reflection of society's changing attitudes and goals. As a result, the number of people available for work has increased. Some of these individuals exercised a preference to work full-time or part-time, while others were forced to work part-time because the economy was unable to satisfy their preferences for full-time employment (Labour Canada 1983).

b) The growing importance of the service and trade industries have created a demand for workers and employers motivated by practical and economic considerations have decided to substitute part-time for full-time workers (Bruner 1989).

c) Institutional changes have created a more favourable atmosphere for the growth of part-time employment. For example, the relaxation of provincial laws on Sunday shopping in Alberta has resulted in an increased demand for part-time workers in the retail trade sector. In addition, employers willingness to offer part-time employment to would be employees has contributed to the rise of part-time employment.

d) The employment of full and part-time workers fluctuate with the stage of the business cycle (Willacy 1970). For example in an economic recession, employers tend to hire part-time workers. As a result, most job seekers are willing to accept part-time employment in a recession since it is the only form of employment available. In the expansionary phase, the reverse is expected to occur. Employers are

TABLE 1

Employment and Economic Growth - Alberta
(Full-Times vs. Part-Time)

Year	Full-Time		Part-Time		Real GDP
	No. (000)	% Change	No. (000)	% Change	% Change
1976	729	5.4	110	13.4	4.4
1977	766	5.1	114	3.6	5.0
1978	812	6.0	126	10.5	6.1
1979	882	8.6	125	-0.8	11.1
1980	942	6.8	136	8.8	4.9
1981	1,007	6.9	145	6.6	6.3
1982	980	-2.7	148	2.1	-4.5
1983	939	-4.2	163	10.1	-2.8
1984	936	-0.3	167	2.5	4.7
1985	950	1.5	174	4.2	4.0
1986	968	1.9	173	-0.6	1.0
1987	969	0.1	178	2.9	3.3
1988	1,002	3.4	184	3.4	8.7

Source: (1) Statistics Canada, Historical Labour Force Statistics, Cat. #71-201
(2) Alberta Treasury, Alberta Economic Accounts 1987, 1988

willing to hire staff on a full-time basis and job seekers wanting full-time employment are able to find it. However, this pattern of behaviour is greatly influenced by the severity of a recession. If a recession was very severe, employers would be very reluctant to hire staff on a full-time basis at the end of the recession preferring instead to satisfy their staffing requirements with part-time workers.

The annual data on part-time/full-time employment and the growth rate of GDP for Alberta data are listed in Table 1. Full-time employment increased by 38.1% between 1976 and 1981, while part-time employment grew by 31.8% over the same period. The provincial GDP (in 1981 $) increased from $36,628 million in 1976 to about $50,513 million in 1981 or by 37.9%. The growth rates in part-time and full-time employment over the 1976-1981 period are in keeping with prior expectations where the growth rate of full-time employment is expected to exceed that of part-time employment in times of economic expansion.

The period 1981 to 1988 was characterized by much slower economic growth. For example, the provincial GDP grew by 18.6% as opposed to 37.9% over the 1976-1981 period. In keeping with the explanations outlined above, the growth in part-time employment was expected to outstrip that for full-time employment. In 1981 there were 1,007,000 full-time employees and by 1988 their number declined to 1,002,000 or by 0.5%. On the other hand, part-time employment grew from 145,000 jobs in 1981 to 184,000 jobs in 1988 or by 26.9%.

The May 1989 Labour Force Survey in Table 2 shows that 59,400 persons (or 15.2% of the labour force) were employed as part-time employees in the Edmonton C.M.A. The majority of employees were in the 15-24 years category (26,300 jobs) and 25-44 years category (21,400 jobs), which accounted for 80.3% of all part-time employment. The 15-24 years group matches that for the secondary and post-secondary student population and, as a consequence, it can be expected that a significant amount of individuals in the 15-24 age group are students working part-time (see Table 2).

The age/sex breakdown of the Labour Force Survey data for Edmonton reveals that of the total part-time employment of 59,400 persons (72.4%), 43,000 persons were females or 72.4%. The majority of female part-time employees were in age groups 15-24 years (16,100 jobs) and 25-44 years (18,100 jobs) which amounted to 57.6% of the total part-time employment.

The concentration of part-time employment in the 15-44 years age groups and among females is determined by attendance at school and family responsibility (Akyeampong 1986). Males in the 15-44 years age groups accounted for 13,500 part-time jobs or 22.7% of total part-time employment. The data shows that very few part-time employees were males in the 25 years plus category. As at May 1989, 6,200 of male part-time workers were in the 25 and over age groups.

TABLE 2

Part-Time Employment
(Edmonton C.M.A.)

	Males (000)	Females (000)	Both Sexes (000)
15 - 24 years	10.2	16.1	26.3
25 - 44 years	3.3	18.1	21.4
45 + years	2.9	8.8	11.7
All Ages	16.4	43.0	59.4

Source: Statistics Canada, Labour Force Survey, May 1989

2.2 Growth of the Service Sector (1971-1986)

The closure of manufacturing plants in North America has resulted in job losses and increased financial stress for many municipalities.(7) For example, between 1981 and 1986 the Alberta economy lost 11,000 manufacturing jobs; the Edmonton C.M.A. accounted for 1,700 of the total manufacturing job loss. These changes were occurring at the same time that significant employment growth was evident in the service producing sectors. The net effect of job losses in manufacturing and job gains in services has prompted some public figures to argue that the industrial base in general and the manufacturing industry in particular is being eroded.

In order to assess the validity of this assertion the following questions must be answered:

- Has service output and employment increased in absolute and relative terms?

- Has manufacturing output and employment declined in absolute and relative terms?

The service industry division is made up of several different activities: business services, government services, education services, health and social services and accommodation, food and beverage services.

Employment in Alberta's service industry increased from 159,000 jobs in 1971 to 324,000 jobs in 1981 and climbed to 378,000 jobs by 1986. In the Edmonton C.M.A., employment in services grew from 59,000 jobs in 1971 to 110,000 jobs in 1981 and then increased to 125,900 jobs by 1986. The service industry became an important source of employment between 1981 and 1986 as it increased its share of total employment from 30.9% in 1981 to 35.3% in 1986.

In 1971 the service industry accounted for 15.0% of the provincial gross domestic product (GDP); by 1981 and 1986 the share shifted to 14.2% and 15.5% respectively. Real output per worker held steady from $80,000 in 1971 to $79,500 in 1976 and then plummeted to $73,000 by 1986.

In 1971, employment in Alberta's manufacturing industry was 59,000 jobs and this increased to 105,000 jobs by 1981. With the advent of the recession in 1982, employment fell from the 1981 high of 105,000 jobs to 94,000 jobs in 1986 with some fluctuation. There were 24,900 jobs in the manufacturing industry in the Edmonton C.M.A. in 1971 and this grew to 40,900 jobs by 1981 before falling to 38,300 jobs by 1986. In 1971 manufacturing accounted for 11.4% of the total C.M.A.'s employment and by 1981 and 1986 it fell to 11.1% and 10.9% respectively.

Alberta's real manufacturing output was $6,460 million in 1971 and this increased to $13,639 million in 1981. With the onset of the recession in 1982/1983 manufacturing output fell to $11,297 in 1983 and then recovered

strongly to reach $13,297 million in 1985. The collapse of world oil prices in 1986 resulted in a slowing of economic activity and manufacturing output fell to $12,439. Real manufacturing output per employee was estimated at $109,000 in 1971 and then increased to $129,000 and $149,000 by 1981 and 1987.

In 1971 manufacturing accounted for 28.3% of the province's GDP and by 1981 and 1987 the share was 30.1% and 28.0% respectively.

The data analysis showed that:

- Employment in services increased in absolute and relative terms over the 1971-1981 and 1981-1986 periods.

- Output in the services increased in absolute terms but its share of total output remained relatively constant. Output per service worker (or productivity) has declined.

- Employment in manufacturing increased in absolute terms between 1971 and 1981 and then declined between 1981 and 1986.

- Output in manufacturing increased between 1971 and 1981 and then declined between 1981 and 1986. Manufacturing's share of total provincial output remained relatively constant over the 1971-1986 period.

The general conclusion that arises from this analysis is that the manufacturing base is not being eroded. Manufacturing employment has declined but output per employee has increased. The traditional link between output and employment is being weakened. What is occurring is not the de-industrialization of output but of the labour force.

The 1981-1986 period was one of decline for the Edmonton labour market as employment fell from 359,000 to 351,300 jobs.[8] The service industry, however, proved to be resistant to this trend as service employment increased from 110,000 jobs in 1981 to 126,000 jobs by 1986. All sectors of the service industry, with the exception of business services, experienced employment gains. The strongest growth sectors were health and welfare services and personal services which grew from 26,000 to 32,500 and 22,000 to 28,600 jobs respectively over the 1981-1986 period.

The increase in service employment is explained by a number of factors, chief among which are:

- The temporary help industry has expanded in recent years. Employers are attracted to temporary help because of lower fringe benefit costs and because of employers' need to meet deadlines under changing economic conditions. In addition, temporary employment offers workers flexibility in scheduling their non-work time and the opportunity for skill upgrading (Personick 1987).

TABLE 3

Employment Increases - Alberta
(000)

Size of Business Employment	Continuously Identified	Newly Identified	No Longer Identified	Total
<5	31.2	79.2	-29.7	80.7
5-19.9	1.7	49.8	-36.6	14.9
20.49.9	-0.8	24.3	-26.5	-3.0
50-99.9	2.9	12.6	-16.7	-1.2
100-499.9	4.6	21.5	-24.0	2.1
500+	42.0	21.2	-10.9	52.3
Total	**81.6**	**208.6**	**-144.4**	**145.8**

Source: Statistics Canada, Developing a Longitudinal Database on Businesses

of 3,000 jobs and businesses with 50 to 99.9 employees suffered employment losses of 1,200 jobs.

Newly identified businesses had a net increase of 64,200 jobs or 44% of the total net increase in employment and, as a result, the remaining 56% is attributed to businesses that were continuously identified. The newly identified businesses with less than 5 and 5 to 19.9 employees created on a net basis 49,500 and 13,200 jobs respectively; businesses in these groups were thus responsible for creating 62,700 jobs or 43.0% of the total increase. Newly identified businesses with 20-49.9, 50-99.9 and 100-499.9 employees suffered net job decreases of 2,200; 4,100 and 2,500 jobs respectively. Businesses that had employment in excess of 500 jobs and were newly identified were responsible for a net increase of 10,300 jobs. The data analysis thus reveals that businesses with less than 20 and more than 500 employees accounted for 73,000 of the 145,800 jobs that were created over the 1978-1984 period.

Job creation in existing businesses followed a pattern that was similar to that of the newly identified businesses, where employment growth was concentrated in firms with employees of 1-5 and 500 plus; these two groups created 73,200 of the 81,600 jobs that were created over the 1978-1984 period. Businesses with 50-99.9 and 100-499.9 employees that were continuously identified created 7,500 jobs on a net basis.

Comparable data for the Edmonton area is not readily available.(9) The available data on individual businesses presents a static picture of the labour market and thus does not allow for the identification of the sources of job losses and gains. A recent research report from the Planning and Development Department (Walters and Huang 1988) that analyzes this data concludes that:

- The majority of establishments employ the minority of employees. For example, 87.5% of all establishments in the Edmonton area employ 28.3% of all employees. In contrast, 11.4% of all establishments employ 71.7% of all employees.

- In the Edmonton area 87.5% of all establishments employ between 1 and 19 employees. On the other hand, businesses with more than 100+ employees account for 1.8% of all establishments and employ 46.8% of all employees.

The Edmonton C.M.A. accounts for about 30% of the total provincial employed labour force. As a result, it can be assumed that the job generation pattern in the province would be the same as in Edmonton. Job creation in Edmonton is therefore expected to be generated by small and very large firms.

Conclusion

The data clearly shows that over the 1978-1984 period:

- Small and large businesses were responsible for approximately 90% of all net job creation in Alberta.

- The majority of new jobs in firms with less than 5 employees were created by businesses that were newly identified during the 1978-1984 period.

- The majority of new jobs in firms with more than 500 employees were created by businesses that were continuously identified during the 1978-1984 period.

The above results challenges the basic assumption on economic development that the local economies can be diversified by attracting large and medium sized firms to relocate in a given municipality. The job creation record of medium sized firms over the 1978-1984 period has been dismal. Businesses with 20-49.9 and 50-99.9 employees lost on a net basis 3,000 and 1,200 employees in Alberta. The net business units create in these categories was also insignificant. On the other hand, job creation among firms with 500 or more employees was relatively strong. This increase was achieved with a reduced number of firms. These large business units tend to be financially strong and require little help on locating new facilities. Attention should therefore be focused on assisting the small business which the data shows have been the most successful at new employment creation.

2.4 The Labour Force

Over the next five years the Edmonton labour force will be shaped by two demographic facts:

- The aging of the working age population and the labour force.

- An increase in the numbers of women in the labour force.

2.4.1 Aging

The average age of the City of Edmonton's working age population is expected to increase from an estimated 33.9 years in 1976 to 36.5 years by 1993. The aging of the working age population and the labour force is a direct result of the decline in the birth rates during the 1970's.

Individuals in the 15-19 and 20-24 year age groups are expected to account for a declining share of the working age population and labour force (see Figures 2 and 3). In 1976 and 1981, the 15-19 years age group were 15.8% and 11.8% of the total working age population, however, by 1986 this figure fell to 9.9% and it is projected to fall to 8.0% by 1993 (City of Edmonton 1989). Moreover, the numbers of individuals in this group have declined from 50,275 to 44,899 persons in 1976 and 1981 respectively and should continue on this declining trend to 34,054 persons by 1993 (see Table 4).

The reduction in the numbers of new entrants into the working age population has had a direct impact on the growth of Edmonton C.M.A.'s labour force. For example, between 1976 and 1981 the labour force increased by 28.4% or by 5.7% per year; however, from 1981 to 1988 (which is a much longer period than 1976 to 1981) the labour force grew by 11.3% or by 1.6% per year. Similarly for the City of Edmonton, the working age population grew from 317,393 to 382,022 persons between 1976 and 1981 or by 4.7% per year. From 1981 to 1986, the working age population for the City increased from 382,022 to 410,910 persons or by 1.5% per year. The Planning and Development Department projects the working age population to increase to 424,355 persons in 1993 from 410,910 in 1986, which represents an annual growth rate of 0.65%.

The current and future decline in the numbers of individuals in the 15-19 and 20-24 year age groups is expected to have a significant impact on the hiring practices of employers in such sectors as Trade, Finance and Services. These sectors have traditionally employed a disproportionate number of young or unskilled workers (Cohen 1989). Employers in retail trade difficulties in staffing positions. In the Edmonton area (Rempel 1989) owners of "fast-food" restaurants are finding it difficult to hire and retain staff for jobs that pay $5.00 per hour.

The problems of finding young workers to staff unskilled jobs may be further exacerbated by the fact that industries have traditionally

TABLE 4

Age Distribution - City of Edmonton Working Age Population

Age	1976	%	1981	%	1986	%	1993	%
15 - 19	50,275	15.8	44,899	11.8	40,678	9.9	34,054	8.0
20 - 24	58,736	18.5	74,786	19.6	68,334	16.7	44,980	10.6
25 - 34	75,412	23.8	112,286	29.4	129,043	31.4	130,845	30.8
35 - 44	51,895	16.3	60,348	15.8	74,635	18.3	104,083	24.6
45 - 54	48,094	15.2	50,895	13.3	52,567	12.8	62,599	14.8
55 - 64	32,981	10.4	38,808	10.1	44,933	10.9	47,794	11.2
Working Age Population	317,393	100.0	382,022	100.0	410,910	100.0	424,355	100.0
Total Population	461,559	-	521,205	-	571,506	-	618,235	-
Working Age Population as a Total Percentage of Total Population		68.8		73.3		71.9		68.7

Source: City of Edmonton, Edmonton Demographic Indicators 1988, February 1989.

Investment was fed by high confidence levels as all economic sectors grew (Planning Department 1985). As a result, Alberta's GDP climbed from $26,851 million in 1971 to $36,628 million in 1981 in constant (1981) dollars or by 3.6% per year.

As world oil prices soared, producers increased production while consumers reduced consumption of oil and energy related products and as a consequence, supply soon exceeded demand in oil markets in the 1980's. The price of oil plummeted. Conditions in the Alberta energy sector were further complicated by the imposition of the National Energy Program by the Canadian government, which favoured frontier exploration at the expense of Alberta. In addition, the federal program encouraged the formation and growth of several marginal firms which had high debt-equity ratios (Economic Council of Canada 1984). Investment in the Alberta economy thus slowed drastically. For example, business investment in Alberta fell from a peak of $17,248 million in 1981 to $9,752 million in 1986 in constant (1981) dollars. It is, therefore not surprising that the economy grew very slowly in real terms from $50,513 million in 1981 to $54,452 million by 1986 or by 1.6% per year.

The estimated impact of the Alberta mining sector on the Edmonton economy is not well documented. The Planning and Development Department (Huang 1989) estimates that a $1.00 drop in the real world oil price would result in a reduction in the Edmonton C.M.A.'s employment by 1,000 to 1,500 jobs. In addition, it has been argued that Edmonton benefits from the energy sector by serving as an important manufacturing and service centre for the energy industry (Planning Department 1985).

In response to depressed economic and financial conditions in the 1980's and the abolition of the National Energy Program, the energy sector adjusted through closures, mergers, re-trenching of staff and by instituting labour saving devices. The outcome of these measures was an increase in productivity. For example, output per worker in the mining sector was on a downward trend in the 1970's as it fell from $302,000 in 1971 to $142,000 in 1981; however, from 1981 to 1986 output per worker grew from $142,000 to $186,000.

2.6 Summary of Emerging Forces and Impact on Resulting Trends

- Part-time employment's share of total employment in Alberta increased from 13.1% in 1976 to 15.5% in 1988. Several factors have contributed to the growth of part-time employment in Canada: the increase in the labour force participation of women, the growing importance of the service sector, institutional change and the employment of full and part-time workers.

- Employment in the Edmonton C.M.A.'s service industry increased from 59,000 jobs in 1971 to 124,000 jobs in 1986. The increase in service employment is explained by several factors: expansion of the temporary help industry, increase in contracting out of tasks by public and private sector organizations and the growing labour force participation of women.

- Small and large businesses in Alberta were responsible for approximately 90% of all net job creation in Alberta. The job creation record of medium sized firms has been dismal.

- The average age of the City of Edmonton's working age population is expected to increase from an estimated 33.9 years in 1976 to 36.5 years by 1993. This is expected to have a significant impact on the hiring practices of employers in such sectors as Trade, Finance and Services. These sectors have traditionally employed a disproportionate number of young or unskilled workers.

- In 1971, women accounted for 37.5% of Edmonton's labour force and by 1988 this figure increased to 44.6%. During the same period their labour force participation rate grew from 48.6% to 64.7%.

- In response to depressed economic and financial conditions in the 1980's and the abolition of the National Energy Program, the energy sector adjusted through closures, mergers, re-trenching of staff and by instituting labour saving devices.

3. METHODOLOGY FOR FORECASTING LABOUR DEMAND

This section presents a detailed description of the process for forecasting labour demand for the Edmonton C.M.A.[10] In addition, a description is provided of the data sources that are used to generate the forecast.

3.1 Rationale

The labour demand for the Edmonton C.M.A. is determined by utilizing the Edmonton/Alberta employment ratio method.[11] This approach was chosen over the econometric method since detailed time series data on employment by occupation for Edmonton was not available. The fixed coefficient model has been found to be the only tool that is capable of projecting employment for a large number of occupations (Siedule and Leckie 1983). In addition, the ratio method reflects the close relationship between the Edmonton and Alberta economies and thus allows for consistency between the projections.

3.2 Description of Methodology

The methodology involved the following steps (Edmonton Economic Adjustment Committee 1988):

I. The provincial labour demand forecast data from COPS on 511 occupations and 62 industries was downloaded to a microcomputer diskette.

II. The forecast data from Step I was stored on a microcomputer.

III. The forecast data from Step II was aggregated into 18 industries and 20 occupations.

IV. The tables from Step III were stored on a microcomputer.

V. Historical data on employment for 511 occupations and 28 industries for Alberta from the 1981 and 1986 federal census was obtained from Statistics Canada.

VI. Statistics Canada was requested to perform a special tabulation using 1981 and 1986 census data in Step V by aggregating it to the same 18 industries and 20 occupations for Alberta as used in Step III.

VII. The data from Step VI was stored on a microcomputer.

VIII. Historical data on employment for 511 occupations and 28 industries for Edmonton C.M.A. from the 1981 and 1986 federal census was obtained from Statistics Canada.

IX. Upon request, Statistics Canada performed a special tabulation by aggregating the 1981 and 1986 census data to the same 18 industries and 20 occupations as used in Steps III and VI.

X. The data from step IX was stored on a microcomputer.

XI The data in Step X was divided by the data in Step VII to produce the Edmonton/Alberta employment ratio. This ratio is Edmonton's share of total provincial employment.

XII The ratios in Step XI are multiplied by the data in Step IV. The results are the projected labour demand for Edmonton by 18 industries and 20 occupations.

3.3 Limitations

The basic assumption underlying the labour demand projections is that the Edmonton/Alberta employment ratio will remain constant for the rest of the forecast period. This assumption is valid only if the forecast horizon is short; however, as this period lengthens, the assumption loses its validity.

There are two major criticisms of the ratio method.

- Industries are assumed to be allocated across the province in a fixed proportion over time and as a result, changes in the province's industrial structure stemming from changes in government policy, demography, technology and market forces are ignored.

- Occupations are distributed among geographic areas in a fixed proportion for the forecast period. This assertion is questionable in a period of rapid economic and occupational change.

These shortcomings are addressed by providing a range of forecasts to illustrate possible outcomes given varying assumptions.

3.4 Data Sources

There are two sources of data: (1) the 1981 and 1986 Census; and (2) the Canadian Occupational Projection System (COPS).

Census

The data from the 1981 and 1986 federal censuses is the most comprehensive and current data that is available on employment at the provincial and city level, providing information on 511 occupations and 28 industries.

For the current study, Statistics Canada summarized the 511 occupations and 28 industries to match a predefined list of 18 industries and 20 occupations for Edmonton and Alberta.

COPS

The Canadian Occupation Projection System (COPS) provides labour demand projections on 511 occupations and 62 industries in Alberta. The starting point for these forecasts is a set of economic assumptions for the Canadian

Table 5

Occupation Employment Ratios :Edmonton/Alberta

Occupation	Edmonton 1981	Alberta 1981	ratio	Edmonton 1986	Alberta 1986	ratio	Ratio 1986	Ratio 1981	Change (%)
Managerial	37,880	117,250	0.321	41,305	127,780	0.323	0.323	0.321	0.59
Natural Science	17,440	53,650	0.325	18,200	52,950	0.308	0.308	0.325	(5.88)
Social Science	7,080	20,230	0.350	9,245	26,340	0.351	0.351	0.350	0.29
Teaching	14,380	43,500	0.331	15,955	49,755	0.321	0.321	0.331	(3.00)
Medical	16,545	46,285	0.365	20,440	56,775	0.360	0.360	0.365	(1.46)
Artistic	4,650	13,010	0.357	5,885	16,020	0.367	0.367	0.357	2.78
Clerical	77,380	214,020	0.362	72,950	213,710	0.341	0.341	0.362	(5.58)
Sales	35,755	107,145	0.334	37,035	112,000	0.331	0.331	0.334	(0.91)
Service	39,440	125,550	0.314	46,410	150,385	0.309	0.309	0.314	(1.77)
Farming	5,055	79,230	0.064	5,970	84,800	0.070	0.070	0.064	10.34
Fishing	270	2985	0.090	285	2725	0.105	0.105	0.090	15.63
Mining	2480	17045	0.145	1495	12060	0.124	0.124	0.145	(14.80)
Processing	7,900	23,180	0.341	6,635	21,115	0.314	0.314	0.341	(7.80)
Product Fabrica	9,980	25,750	0.388	6,270	17,725	0.354	0.354	0.388	(8.82)
Repair	18555	60710	0.322	17005	57175	0.300	0.300	0.322	(3.92)
Construction	32,555	110,755	0.294	19,435	71,340	0.272	0.272	0.294	(7.29)
Transportation	15,470	50,255	0.308	13,080	46,505	0.287	0.287	0.308	(6.75)
Material Handel	6470	18640	0.347	4330	13700	0.315	0.315	0.347	(9.34)
Other Equip	3,980	12,475	0.317	4080	13225	0.302	0.302	0.317	(4.72)
Other	5025	14820	0.337	6,700	21,185	0.316	0.316	0.337	(6.10)
Total	359,080	1,155,080	0.311	351,320	1,100,430	0.301	0.301	0.311	(3.07)

Source:Statistics Canada. Census 1981,1986

economy. These assumptions are then translated into occupational requirements by using various analytical models and existing data sources (Employment and Immigration Canada 1983).

The COPS data was aggregated to match Statistics Canada's special tabulation of 18 industries and 20 occupations.

3.5 Edmonton/Alberta Employment Ratios

Employment is distributed between Edmonton and the rest of Alberta on the basis of historic (1986 Edmonton/Alberta) employment ratios. These ratios are assumed to hold steady for the forecast period. In this section of the report, employment ratios from 1986 and 1981 censuses are reviewed, so as to determine the validity of the above assumption. It must be noted that the 1986 data is based on the same geographic area as the 1981 data.

Total

In 1981, 31.1% of the Alberta total employed labour force resided in Edmonton. By 1986, this figure declined slightly to 30.1%. This change is expected in view of the provincial government's efforts to diversify the economy and decentralize the functions of the Provincial Government.

Occupations

Most occupations experienced declines in their ratios; the most notable were (see Table 5):

	% Decline
Product Fabrication	8.8
Construction	7.3
Clerical	5.6
Natural Science	5.9

All the declines, with the exception of mining (14.8%) were less than 10%. The change experienced by mining should be regarded as insignificant since employment in that occupation was 2,480 persons or 0.7% of the 1981 employed labour force.

The following occupations experienced (positive) growth over the 1981-1986 period in their ratios:

	% Growth
Fishing	15.6
Farming	10.3
Artistic	2.8
Managerial	0.6
Social Science	0.3

Table 6

Industry Employment Ratios : Edmonton/Alberta

Industry	EDMONTON 1981	ALBERTA 1981	RATIO	EDMONTON 1986	ALBERTA 1986	RATIO	Ratio 1986	Ratio 1981	Change (%)
Agriculture	4,280	81,910	0.052	4,875	86,120	0.057	0.057	0.052	8.33
Resources	9,090	77,085	0.118	6,635	71,560	0.093	0.093	0.118	-21.39
Manufacturing	40,000	105,000	0.381	38,300	94,000	0.407	0.407	0.381	6.95
Construction	37,960	122,760	0.309	21,770	73,180	0.297	0.297	0.309	-3.80
Transportation	19,705	60,235	0.327	18,955	60,415	0.314	0.314	0.327	-4.09
Communication	10,180	25,210	0.404	9,845	23,330	0.422	0.422	0.404	4.50
Utilities	4,140	12,330	0.338	4,085	12,895	0.317	0.317	0.338	-5.65
Retail Trade	43,820	136,140	0.322	45,210	153,520	0.294	0.294	0.322	-8.51
Wholesale Trade	21,840	60,355	0.362	18,170	59,430	0.306	0.306	0.362	-15.51
Finance	22,835	64,480	0.354	20,360	59,365	0.343	0.343	0.354	-3.19
Education Services	25,125	70,985	0.354	27,195	82,290	0.330	0.330	0.354	-6.88
Health & Welfare S	25,975	74,715	0.348	32,530	94,380	0.345	0.345	0.348	-0.88
Amusement & Recrea	3,530	9,960	0.354	5,170	14,500	0.357	0.357	0.354	0.60
Business Services	20,495	61,535	0.333	19,410	60,500	0.321	0.321	0.333	-3.67
Personal Services	22,915	74,205	0.309	28,625	92,515	0.309	0.309	0.309	0.20
Miscellaneous Serv	12,150	32,235	0.377	12,945	37,050	0.349	0.349	0.377	-7.30
Public Administart	35,050	86,575	0.405	37,245	91,435	0.407	0.407	0.405	0.61
Total	359,090	1,155,655	0.311	351,325	1,166,485	0.301	0.301	0.311	-3.07

Industries

Most industries experienced declines in their ratios, the most notable were (Table 6):

	% Decline
Resources	21.4
Wholesale Trade	15.5
Retail Trade	8.5

All the declines with the exception of forestry and wholesale trade were below 10%. In 1981, forestry and trade represented 2.5% and 6.0% of the employed labour force respectively.

The following industries recorded postive growth over the 1981-1986 period in their ratios:

	% Growth
Agriculture	8.3
Manufacturing	6.9
Communication	4.5
Amusement and Recreation	0.6
Personal Services	0.2
Public Administration	0.6

The changes recorded by fishing and farming can be ignored since their 1981 employment bases were very small.

Summary

Edmonton lost employment relative to the rest of Alberta over the 1981-1986 period. The declines were modest, since they were generally less than 10%. As a result over the period 1981-1986, the Edmonton/Alberta employment ratios appeared to be stable and can be used for forecasting purposes.

4. LABOUR DEMAND PROJECTIONS

This Section presents a series of labour demand projections for Alberta and Edmonton over the 1989-1993 period. They are based on two different data sources: (1) COPS; and (2) the Conference Board of Canada. Based on these projections, a most probable set of labour demand figures is identified.

The alternative projections were prepared to resolve a perceived problem with COPS numbers as they apply to Alberta and Edmonton. The COPS forecast for Alberta are derived by applying a provincial share to the national forecast. This methodology is unable to capture fluctuations in the level of investment and, as a result, the forecast ignores investment intentions in various sectors. The COPS projection shows the employed labour force in Alberta increasing from 1,189,950 persons in 1988 to 1,227,600 persons in 1993 or by 3.2%. The Conference Board of Canada forecasts (Spring 1989) Alberta's employment to grow from 1,186,000 jobs in 1988 to 1,320,000 jobs by 1993 or by 11.3%.

4.1 Labour Demand Projections - COPS

4.1.1 Labour Demand - Alberta

Total labour demand in Alberta in 1989 is estimated at 1,208,400 jobs which represents a 1.6% increase over the 1988 level of 1,189,900 jobs. Employment is forecasted to grow from 1,208,400 persons in 1989 to 1,227,600 persons by 1993 with some fluctuation. The total growth over the 1989-1993 period is 19,200 jobs or 1.6%.

Occupations

The occupations that are forecasted to grow at or above the average provincial growth rate of 1.6% or experience employment growth of more than 1,500 jobs are as follows (Table A1):

	1989-1993 Job Increase	% Growth
Product Fabrication	100	7.1
Service	4,900	3.5
Farming	2,200	2.5
Transportation	900	2.1
Artistic	600	3.6
Sales	2,400	2.0
Clerical	2,500	1.1
Managerial	1,800	1.3

The employment base for product fabrication in 1988 is estimated at 1,400 jobs; as a result, the employment change of 100 jobs over the 1989-1993 period should be regarded as being insignificant.

These occupations together account for 15,400 jobs or 80.0% of the expected job increase between 1989 and 1993.

Industries

The industries that are forecasted to grow at or above the average provincial growth rate of 1.6% or experience employment growth of more than 1,500 jobs are as follows (Table A2):

	1989-1993 Job Increase	% Growth
Agriculture	2,600	2.8
Retail Trade	4,300	2.7
Personal Services	700	2.4
Miscellaneous Services	7,900	6.7

These occupations together account for 15,500 jobs or 80.7% of the expected total job increase between 1989 and 1993.

4.1.2 Labour Demand - Edmonton

Total labour demand in Edmonton[12] in 1989 is estimated at 365,500 jobs which is an increase of 1.3% over the 1988 level of 360,900 jobs. Employment is forecasted to grow from 365,500 jobs in 1989 to 371,100 jobs by 1993 with some fluctuations. The total growth over the 1989-1993 period is 5,600 jobs or 1.5%.

Occupations

The occupations that are forecasted to grow at or above the City growth rate of 1.5% or experience employment growth of more than 500 jobs are as follows (Table A3):

	1989-1993 Job Increase	% Growth
Managerial	600	1.4
Artistic	200	3.2
Clerical	800	1.0
Sales	800	2.0
Service	1,500	3.5
Farming	100	1.6
Transportation	200	1.6

These occupations together account for 4,300 jobs or 75.0% of the expected job increase between 1989 and 1993.

The following occupations are forecasted to achieve little or no growth over the forecast period:

	% Growth
Fishing	0
Mining	0
Product Fabrication	0

Material Handling	0
Construction	-0.5

Industrial Divisions

The industries with a forecasted increase larger than 500 jobs or employment growth of more than the City average growth rate of 1.5% are as follows (Table A4):

	1989-1993 Job Increase	% Increase
Manufacturing	500	8.4
Retail Trade	1,200	2.6
Miscellaneous Services	2,700	6.6
Agriculture	100	1.9
Personal Services	200	2.2

These industries account for 75% of the total job increase in Edmonton.

The following industries are expected to experience very little growth:

	% Growth
Utilities	0
Wholesale Trade	0
Finance	0
Amusement and Recreation	0
Public Administration	0
Construction	-0.8
Communication	-4.3

4.2 Conference Board

Total Labour Demand

Total labour demand in Alberta is estimated at 1,185,900 jobs in 1988 and is expected to grow to 1,215,600 jobs in 1989, an increase of 29,700 jobs or 25%. Between 1989 and 1993 total employment is projected to grow from 1,215,600 jobs to 1,327,500 jobs in 1993 or by 9.2%. All industrial groups, with the exception of resources and agriculture are forecasted to show job gains in excess of 5,000 jobs over the 1989-1993 period (Table A5):

	1989-1993 Job Increase	% Increase
Service	43,900	10.7
Trade	30,200	13.8
Transportation	13,100	13.7
Construction	7,200	9.6
Manufacturing	8,200	8.4

Finance	6,200	9.9
Public Administration	5,200	5.7

The total job gains for these seven industries are 114,000 jobs or 101.9% of the total increase between 1989-1993. The total job increase projected by the Conference Board for Alberta is not only much larger than the COPS projection, it has a much different distribution among industries as compared to COPS. For example, Community, Business and Personal Service industries account for 63.5% of COPS total job increase while it has only 39.2% of the Conference Board's total job increase.

Edmonton

The Edmonton projected labour demand by industry division is derived from the Alberta projected labour demand by using Edmonton/Alberta employment ratios as used for the COPS projections for Edmonton. The ratios show the 1986 proportion of employment in Edmonton relative to Alberta for a given industry.

Total labour demand in Edmonton is expected to increase by 37,300 jobs between 1989-1993, as the total jobs in 1989 and 1993 are forecasted at 370,100 and 407,400 respectively. Agriculture and resources are the only industries that are expected to experience no job gains. Industries that are forecasted to show job increases over 3,000 jobs are as follows (Table A6):

	Job Increase	% Increase
Services	14,500	10.7
Trade	10,000	13.7
Transportation	4,500	13.7

4.3 Most Probable Alberta Projections

Comparison of COPS/Conference Board Projections

There are highly significant differences in the labour demand forecasts over the 1989-1993 period, at the industry level, between COPS and the Conference Board. The forecasted job growth for the COPS and Conference Board forecasts are as follows:

	COPS	Conference Board
Agriculture	2,600	(800)
Resources	400	(1,300)
Manufacturing	1,300	8,200
Construction	(700)	7,200
Transportation	(700)	13,100
Trade	4,500	30,200
Finance	0	6,200
Services	12,200	43,900
Public Administration	0	5,200
Total	19,200	111,900

TABLE 7

Most Probable Labour Demand - Alberta

Industry Division	1988 (2) Actual	1989 (1)	1993 (1)	Growth 1993 - 1989	Growth (%CH)
Agriculture	94,000	90,000	91,000	1,000	1.2
Resources	70,000	68,000	70,700	2,700	4.0
Manufacturing	95,000	98,100	106,300	8,200	8.4
Construction	73,000	72,000	82,000	10,000	13.9
Transportation	93,000	93,000	93,500	500	0.6
Trade	214,000	216,000	220,300	4,300	2.0
Finance	60,000	63,500	65,000	1,500	2.4
Service	402,000	416,000	440,000	24,000	5.8
Public Admin.	87,000	93,000	97,000	4,000	4.3
TOTAL	1,188,000	1,209,600	1,265,800	56,200	4.5

Source: (1) Planning and Development Department, September 1989

(2) Alberta Bureau of Statistics, Alberta Statistical Review, First Quarter 1989, May 1989

The two forecasts chart completely different pictures of the province's future labour market. COPS projects moderate growth in services and trade and very little activity in the remaining industries. As a result, COPS expects total employment in all industries to increase by 19,200 jobs. The Conference Board expects growth in most industries, with declines in resources and agriculture. In addition, they forecast strong growth in services and trade and moderate growth in transportation, manufacturing and construction. There is agreement between the two forecasts that growth will occur in manufacturing, trade and services.

Clearly the choice between the two forecasts, either at the total level or for specific divisions will determine to a significant degree the findings of this study regarding labour demand. As well, the magnitude of the differences between these forecasts strongly suggests that a regular monitoring of actual labour growth by industry division is necessary.

Industrial Divisions

- **Agriculture**

  The most probable estimates of labour demand in agriculture for 1989 and 1993 are 90,000 and 91,000 jobs respectively. The projected job growth over this period is 1,000 jobs or 1.1% well below the average labour demand growth rate of 4.5% (see Table 7).

  Drought conditions in North America in 1988 resulted in a reduction of grain inventories. As a result, world prices of grains and oilseeds rose in response to the reduced supply. The Conference Board (Winter 1989) contends that stock utilization ratios will remain low over the next two years as carry-over stocks will be minimal. Production and demand are therefore expected to be more closely matched thus ensuring price stability.

  Labour demand in agriculture has been stable in recent years. At best, this trend is likely to continue as increasing productivity, low output prices, subsidized competition in export markets, rising input prices and uncertain conditions combine to squeeze profit margins and thus reduce the demand for labour in this sector.

  COPS estimates labour demand in agriculture at 92,800 and 95,400 jobs for 1989 and 1993 respectively. The Conference Board estimates for 1989 and 1993 are 94,500 and 93,700 jobs respectively. The current conditions in the industry do not support COPS optimism nor the Conference Board's pessimism. The most probable forecast is for relative stability.

- **Resource Extraction**

The most probable projections for this industry in 1989 and 1993 are 68,000 and 70,700, which is an increase of 700 jobs or 4.0% over this period. The rate of job creation in the resource extraction industry is therefore expected to be well below the provincial average of 4.5%.

Job creation in the resource industry is expected to be constrained by high interest rates, increased labour productivity and oil price instability. On the other hand, business confidence in this sector is expected to be boosted by reduced provincial oil and gas royalties, drilling incentives and lower operating costs.

World oil prices are forecasted to experience little or no growth as global oil supply continues to exceed demand (Conference Board of Canada, Winter 1989). The world oil supply, in the short run, will be influenced by the following factors:

- OPEC members are expected to exceed production quotas as oil prices exceed marginal cost.

- Oil inventories are expected to increase because of past and current quota violations by OPEC.

- Non-OPEC oil production is expected to increase.

As a result of price instability in world oil markets, investment activity in oil projects will be constrained. The Conference Board (Spring 1989) expects oil and gas exploration to decline by 15% in 1989.

Several projects have been delayed or cancelled:

- Husky oil has closed its heavy oil wells in Alberta.
- Suncor has closed its Fort Kent operations and reduced activity at Burnt Lake and Mildred Lake.
- OSLO has been delayed.
- ESSO Resources has reduced its operations at Cold Lake.

The future for natural gas prices is good as sales to the United States are expected to increase over the short to medium term. The main constraint on increasing sales to the United States is the limited capacity of cross-border pipelines.

COPS forecasts employment in resources to grow from 72,700 to 73,100 jobs between 1989 and 1993. Similarly, the Conference Board expects employment to shift from 70,800 jobs in 1989 to 69,500 jobs in 1993. Both agencies expect little or no growth in this section. These expectations are justified in view of the reasons outlined above.

- **Manufacturing**

  The most probable projections for this industry in 1989 and 1993 are 98,100 and 106,300 jobs respectively, an increase of 8,200 jobs or 8.4%. The increase in labour demand in manufacturing is greater than the average labour demand growth of 4.5%.

  The rate of job creation in the manufacturing industry over the short run will be influenced by two opposing forces. First, employment in manufacturing represents a small and declining share of total employment as private and public institutions introduce labour saving devices to control labour costs. Second, employment is likely to increase in manufacturing as the provincial government continues to diversify the provincial economy. As an example by December 1988, over $3 billion in forestry projects were announced.

  COPS forecasts employment in manufacturing to grow from 92,500 to 93,700 jobs in 1989 and 1993 respectively or by 1,300 jobs. The COPS estimate of employment for 1989 appears to be low since it falls short of Statistics Canada's estimate of 95,000 jobs for the first quarter of 1989. In addition, COPS' projections of employment growth does not appear to account for developments in the pulp and paper sector. On the other hand, the Conference Board forecasts employment to increase from 98,100 to 106,300 jobs in 1989 and 1993; this appears to be a credible scenario.

- **Construction**

  The most probable projections for this industry in 1989 and 1993 are 72,000 and 82,000 jobs, an increase of 10,000 or 13.9%. The increase in labour demand in this industry is considerably above the provincial average of 4.5%.

  The improving health of the construction industry will be fuelled by continued investment and population growth in Alberta. As of December, 1988, over $3 billion in forestry projects were announced. In addition, Alberta's population grew by 33,870 persons in 1988 which is a significant change from the 1987 increase of 11,100 persons.

  COPS expects employment in the construction industry to decline from 80,700 to 80,000 jobs between 1989 and 1993. This forecast is not realistic, since it ignores expected population and investment growth. The Conference Board forecasts employment in this industry to grow from 74,800 jobs in 1989 to 82,000 jobs in 1993. This outlook confirms expectations on investment and population growth.

- **Transportation**

  The most probable projections for this industry in 1989 and 1993 are 93,000 and 93,500 jobs respectively, which represents an increase of

500 jobs or 0.5%; which is below the average employment growth rate of 4.5%.

Labour demand in the transportation industry has been affected by deregulation and technological change. The deregulation of the transportation industry has forced companies to rationalize their operations and achieve greater efficiency. The introduction of technological change to the industry has resulted in increased labour productivity. For example, output per employee in the transportation industry was $20,632 ($1971) in 1981 and by 1987 it was estimated at $23,068 ($1971). The combination of deregulation and technological change would reduce the demand for labour in the short run. However, as the economy grows, there should be a slight increase in employment.

The Conference Board forecasts employment in this industry to rise from 95,500 to 108,600 jobs between 1989 and 1993. Meanwhile, COPS projects labour demand to fall from 93,400 to 92,700 jobs from 1989 to 1993. The probable forecast is for relative stability.

- **Trade**

The most probable forecasts for this industry in 1989 and 1993 are 216,000 and 220,300 jobs, which represents an increase of 4,300 jobs or 2.0%. The growth rate in the trade industry's labour demand is therefore below the provincial average of 4.5%.

The Province of Alberta currently has an adequate supply of retail space. For example, the City of Edmonton has a retail floor area of 18 square feet per capita which is much higher than the national average of 9 square feet per capita (Edmonton Journal, September 2, 1989). In addition, there have been significant efforts to raise productivity by introducing new facilities such as megafood stores and rationalizing existing facilities. As a consequence, a significant upturn in the provincial economy may not result in a shortage in retail space. Employment in the trade industry is therefore expected to grow at below the provincial average of 4.5%.

The Conference Board expects labour demand in 1988 to be 219,100 jobs and 249,300 jobs by 1993. On the other hand, COPS is forecasting employment for 1989 and 1993 at 220,000 and 224,500 respectively. The probable outcome appears to be closer to the COPS forecast.

- **Finance**

The most probable forecasts for this industry in 1989 and 1993 are 63,500 and 65,000 jobs respectively. The projected labour demand increase over this period is 1,500 jobs or 2.4%, less than the provincial average.

Labour demand in the finance industry has been relatively stable in recent years. For example, in 1981 and 1987 there were 59,600 and

57,000 jobs respectively. This stability is due in large part to the increased use of automation in the banking sector as well as the difficulties experienced by the financial sector in Alberta. On the positive side, the industry should experience employment growth in the real estate sector as the province experiences overall economic growth in the near term.

COPS expects labour demand in 1989 and 1993 to be stable at 63,400. The Conference Board projects labour demand to grow from 62,300 jobs in 1989 to 68,500 jobs by 1993.

- **Service**

The most probable projections for this industry in 1989 and 1993 are 416,000 and 440,000 jobs respectively, which is an increase of 24,000 jobs or 5.8%. The growth in the labour demand is therefore above the provincial average.

The service industry in Alberta has shown itself to be resistant to economic fluctuations. Over the 1981 to 1986 period (when most industries suffered a decline in employment) the service industry increased employment from 323,000 to 399,000. This development is part of a long term and world wide trend as economic development has been observed to follow a predictable pattern in which agricultural employment shifts to manufacturing and then to service.

The trend towards increased labour demand in this industry is expected to continue. The Conference Board projects labour demand in 1988 and 1993 at 408,600 and jobs respectively. Similarly, COPS projects jobs to grow from 405,800 in 1989 to 418,000 in 1993.

- **Public Administration**

The most probable projections for this industry in 1989 and 1993 are 93,000 and 97,000 jobs respectively. This is an increase of 4,000 jobs or 4.3%. The change in the labour demand is close to the provincial average of 4.5%.

The collapse of world oil prices from their 1981 levels resulted in slower economic growth and a reduction in revenues for the Province of Alberta. As a result, the provincial government embarked on an austerity program to balance its budget. This resulted in a reduction in the growth rate of labour demand in the provincial and municipal civil services. This austerity program is expected to last for at least two years, but as the provincial economy and population grow, the public demand for services will increase. The result could be a growth in public administration labour demand, with most of the increase after 1990.

TABLE 8

Most Probable Labour Demand - Edmonton

Industry	Ratio 1986	1988 Actual	1989 Jan-Jul	1989 Most Probable	1993 Most Probable	Change 1993-1989	Change %	Comments
Agriculture	0.057	5,400	5,000	5,100	5,200	100	1.96	Slow
Resources	0.093	6,500	6,100	6,300	6,600	300	4.76	Average
Manufacturing	0.407	38,700	39,500	39,500	43,300	3,800	9.62	Fast
Construction	0.297	21,700	21,100	21,400	24,400	3,000	14.02	Fast
Transportation	0.340	31,600	31,600	31,600	31,800	200	0.63	Slow
Trade	0.306	65,500	65,500	66,100	67,400	1,300	1.97	Slow
Finance	0.343	20,600	22,000	21,800	22,300	500	2.29	Slow
Service	0.332	133,500	138,100	138,100	146,100	8,000	5.79	Fast
Public Admin.	0.407	33,400	38,700	37,900	39,500	1,600	4.22	Average
TOTAL	0.301	358,900	367,600	368,200	386,600	18,400	5.00	Average

Source: Planning and Development Department, September 1989

The collapse of world oil prices from their 1981 levels resulted in slower economic growth and a reduction in revenues for the Province of Alberta. As a result, the provincial government embarked on an austerity program to balance its budget. This resulted in a reduction in the growth rate of labour demand in the provincial and municipal civil services. This austerity program is expected to last for at least two years, but as the provincial economy and population grow, the public demand for services will increase. The result could be a growth in public administration labour demand, with most of the increase after 1990.

The Conference Board expects public administration labour demand to increase from 91,900 jobs in 1989 to 97,100 jobs by 1993 or 5.7%. Meanwhile, COPS is projecting 87,000 jobs in 1989 and 1993.

4.4 Most Probable Edmonton Projections

Total

The most probable Edmonton labour demand is derived from the most probable Alberta labour demand by using the Edmonton/Alberta employment ratio[13].

The most probable total labour demand in Edmonton is projected to grow from 368,200 jobs in 1989 to 386,600 jobs by 1993 or by 18,400 jobs (see Table 8).

Industry Divisions

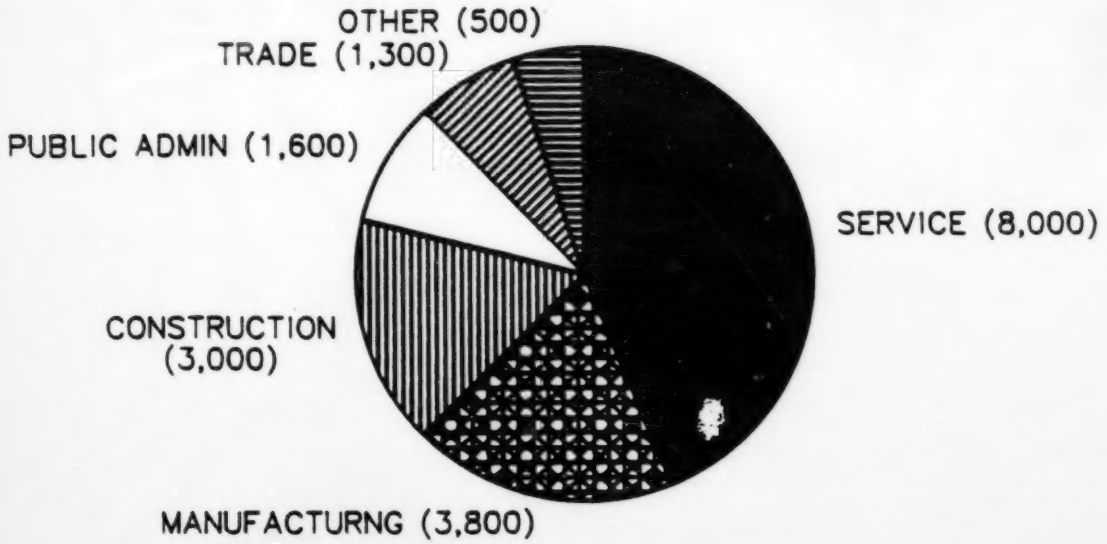
All industry divisions are expected to record job gains. The following divisions are expected to record job gains in excess of 1,000 jobs:

	Job Increase (1989-1993)
Service	8,000
Manufacturing	3,800
Construction	3,000
Public Administration	1,600
Trade	1,300

These divisions account for a total of 17,700 jobs or 95.1% of the expected job increase between 1989 and 1993. Service, manufacturing and construction are expected to experience above average growth (4.9%).

Figure 5

PROBABLE JOB GAINS: EDMONTON 1989–93



Source: The Planning and Development Department, August 1989.

4.5 Conclusion

The major conclusion that emerges from the forecasting exercise is that the provincial and city labour markets are expected to experience significant structural change. The service industry is expected to be the major source of employment for the working age population. For example, 42.7% of the new jobs that will be created between 1989 and 1993 will be in the service industry. The construction and manufacturing industries will provide 32.4% of the job increase over the forecast period. Job creation in the resource industry is expected to be insignificant.

5. THE LABOUR SUPPLY AND DEMAND FORECAST

This section of the report develops labour supply and demand projections for Alberta. The difference between labour supply and demand will be referred to as labour surplus or shortage depending on whether or not supply exceeds or falls short of demand. The study does not develop separate projections for Edmonton because the labour for industries and occupations is relatively mobile within provincial borders. Local labour market imbalances are assumed to be corrected by intra-provincial migration.

5.1 Labour Supply Methodology

The labour supply for a given industry/occupation is drawn from the following sources:

- inter-industry/occupation migrants
- geographic migrants
- new entrants and re-entrants to the labour force
- the labour force from the previous period

A generic version of the labour force can be expressed as:

$$LF_t = F\ (LF_{t-1}, \Delta LF_t)$$

where:
LF_t = labour force at time t
LF_{t-1} = labour force in the previous period
ΔLF_t = change in the labour force

The factors that influence the labour force change have been extensively reviewed in the literature (Killingsworth 1983 and Ashenfelter et al 1986). As a result, a survey will not be attempted here. It will be assumed that individual's decisions to enter or leave the labour force are influenced by their expectations of future income and employment.

The labour supply projections are prepared by using econometric analysis. The equations are based on the assumptions that the current labour supply is influenced by the labour supply from the previous time period, the percentage change in the population and the percentage change in employment. Past and present trends are assumed to continue into the future and the estimated equations are therefore able to capture past migration and attrition rates.

Detailed time series data for occupations and migration are not readily available for Alberta and Edmonton. As a result, it is not possible to prepare a separate forecast for each component of labour supply or occupation. Projections for major industrial divisions were

prepared in the aggregate by estimating the total labour force by industry division. This masks imbalances in various industry sectors and occupations.

5.2 Labour Supply Forecast

This sub-section of the report is divided into two portions. Part 1 (5.2.1) specifies the equations to estimate the labour supply for a given industry division. In addition, the equations are checked to determine their effectiveness in estimating the period 1968 - 1988 by comparing the equation predictions against the actual values over the sample period. The difference (the error) between the actual values and the simulated value is expressed as a percentage of the actual value. Some writers (Rubin 1981) contend that an error term that is less than 10% is acceptable. In part 2 (5.2.2) a forecast is prepared by using the estimated equation from 5.2.1.

5.2.1 Estimated Equations

- **Agriculture**

The labour force in the agriculture industry is represented by:

LFAGRI = F(LFAGRIL, CHAGRI)

where:
LFAGRI = labour force in agriculture
LRAGRIL = labour force in agriculture lagged one period
CHAGRI = percentage change in agriculture employment

The previous period's labour force is expected to have a positive impact on the current labour force and similarly a positive increase in employment is expected to induce individuals to enter the labour market.

Estimating the above equation yields the following results:

LFAGRI = 3872.6 + .95 LFAGRIL + 993.34 CHAGRI
(1.71) (38.57) (34.93)

R^2 = .98 D.W. = 2.35 S.E.E. = 1117.41 RHO = -5.3 1967-1988

These results are in keeping with prior expectations. In addition, the equation shows that 98% of the variation in the dependent variable is explained by the independent variables.

The error terms are all less than 10%; the largest error occurs in 1976 (2.8%). As a result, the equation appears to be acceptable (see Figure 6).

Figure 6

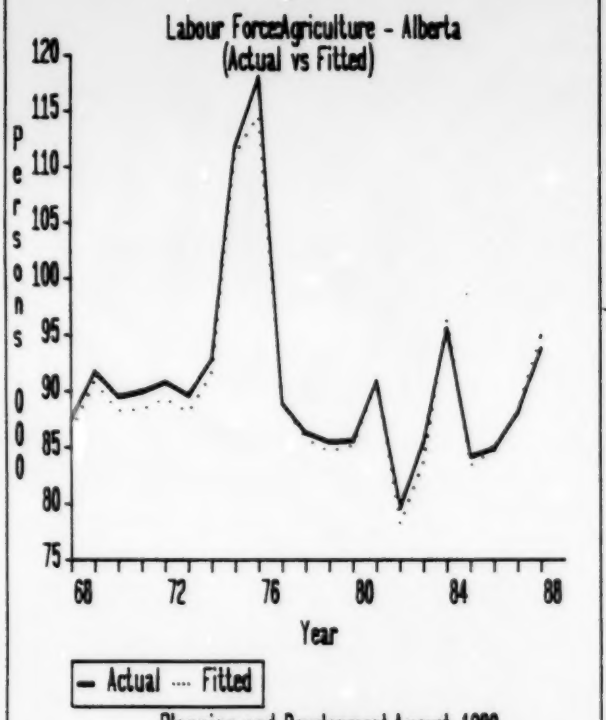


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Figure 7

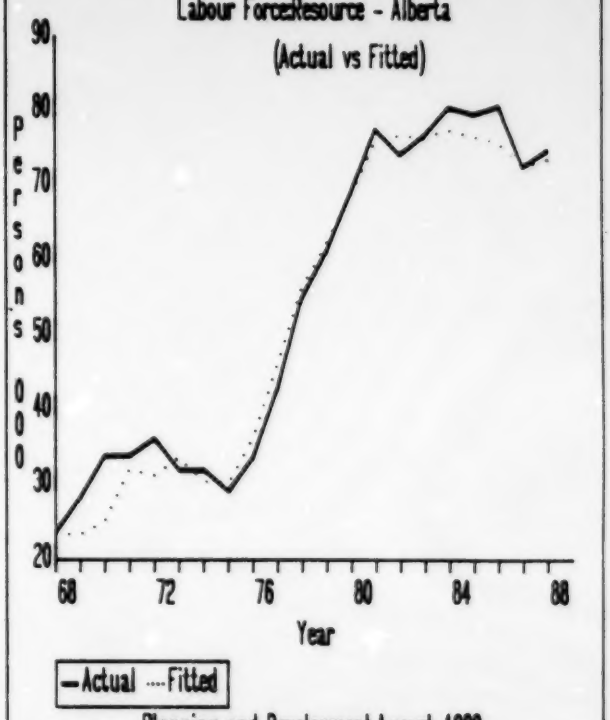

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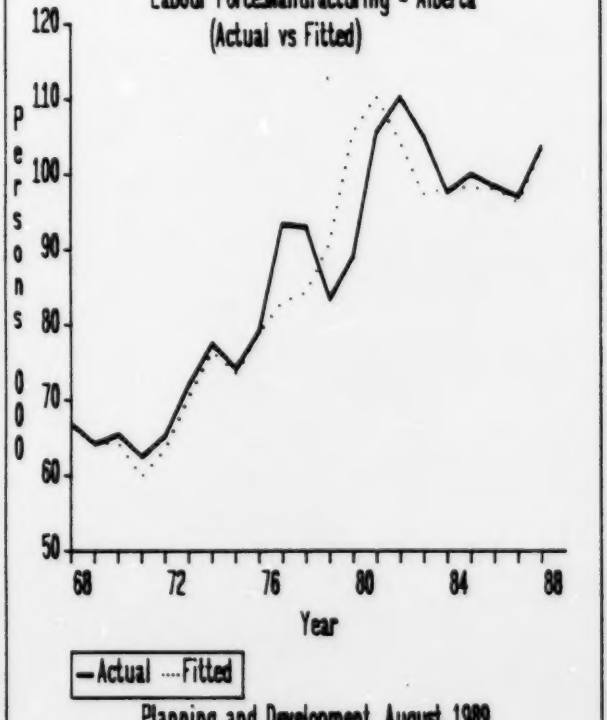
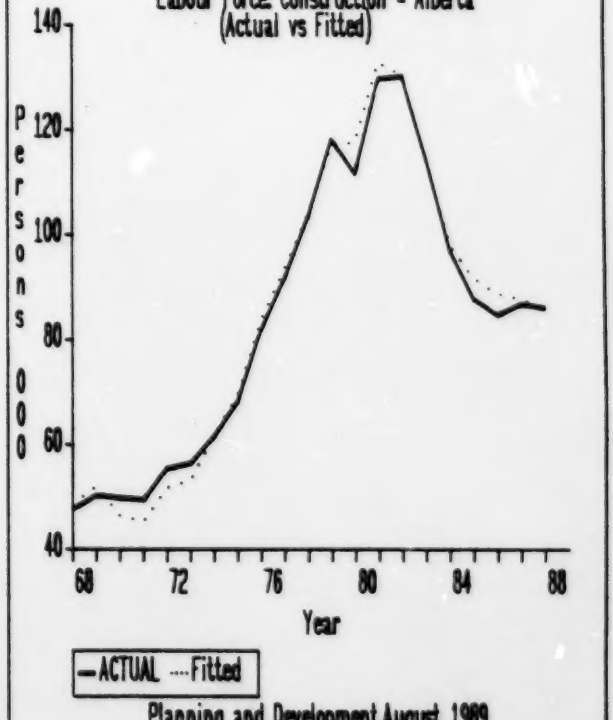
Figure 8



Planning and Development ,August 1989

Figure 9



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- **Resource**

The resource industry's labour force is represented by the following equation:

LFRES = F(LFRESL, CHPOPA, CHRES)

where:
LFRES = labour force in resource
LFRESL = labour force in resource lagged one period
CHPOPA = percentage change in provincial population
CHRES = percentage change in resource employment

The previous period's labour force is expected to be positively related to the current period's labour force. A change in the provincial population is expected to produce a similar change to the labour force and similarly a positive increase in employment is likely to produce a positive increase in the labour force.

Estimating the equation produced these results:

LFRES = 4117.8 + 288.95 CHRES + 1201.31 CHPOPA + 1.04 LFRESL
(-2.09) (4.31) (2.49) (39.81)

R^2 = .98 D.W. = 1.97 S.E.E. = 3321.14 RHO = -.43 1967-1988

These results are expected. The equations shows that 98% of the variation in the dependent variable is explained by the independent variables.

The error terms are all less than 10% except in 1969, 1970 and 1972 when they were 17.5%, 25.5% and 13.3% respectively. The equation therefore provides an acceptable estimate of the sample period (see Figure 11).

- **Manufacturing**

The labour force in manufacturing is represented by the equation:

LFMAUF = F(LFMAUFL, CHMFG, CHPOPA)

where:
LFMAUF = labour force in manufacturing
LFMAUFL = labour force in manufacturing lagged one period
CHPOPA = percentage change in provincial population
CHMFG = percentage change in manufacturing employment

The manufacturing labour force is expected to increase if the provincial population increases and the same result should

occur if employment in the manufacturing industry increases. In addition, the previous year's labour force is expected to be positively correlated with the current labour force.

The estimated equation for the above relationships is as follows:

LFMAUF = -2846.67 + 1.02 LFMAUFL + 683.29 CHMFG + 577.07 CHPOPA
(-2.42) (80.40) (21.12) (3.78)

R^2 = .99 D.W. = 2.05 S.E.E. = 1077.33 RHO = -.22 1967-1988

The results are in keeping with prior expectations. In addition, the equation shows that 99% of the variation in the dependent variable is explained by the independent variables (see Figure 5).

The error terms are all less than 10%. The largest error term is 4.2% and it occurred in 1971. As a result, the equation provides a good estimate of the sample period (see Figure 8).

- **Construction**

The labour force in construction is represented by the equation:

LFCONST = F(LFCONSTL, CHCONST, CHPOPA)

where:
LFCONST = labour force in construction
LFCONSTL = labour force in construction lagged one period
CHCONST = percentage change in construction employment
CHPOPA = percentage change in provincial population

The previous year's labour force is expected to be positively related to the current labour force and the same relationship is expected to exist between a change in employment and the current labour force. In addition, an increase in the provincial population is expected to be positively correlated with the current labour force.

The estimated equation for the above relationships are as follows:

LFCONST = 57773.40 + 1.00 LFCONSTL + 613.70 CHCONST + 2119.49 CHPOPA
(-2.73) (39.96) (8.48) (3.97)

R^2 = .99 D.W. = 2.00 S.E.E. = 2765.7 RHO = -.04 1967-1988

Figure 10

Labour Force:Transportation - Alberta

(Actual vs Fitted)

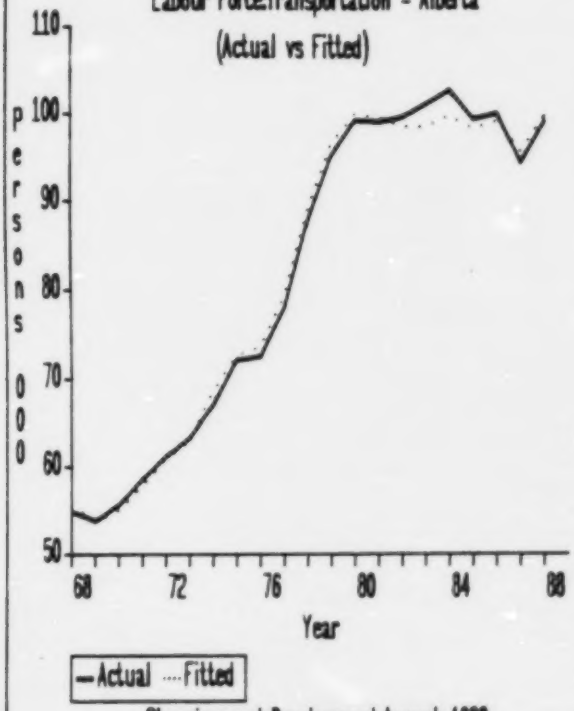

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Figure 11

Labour Force:Trade - Alberta

(Actual vs Fitted)

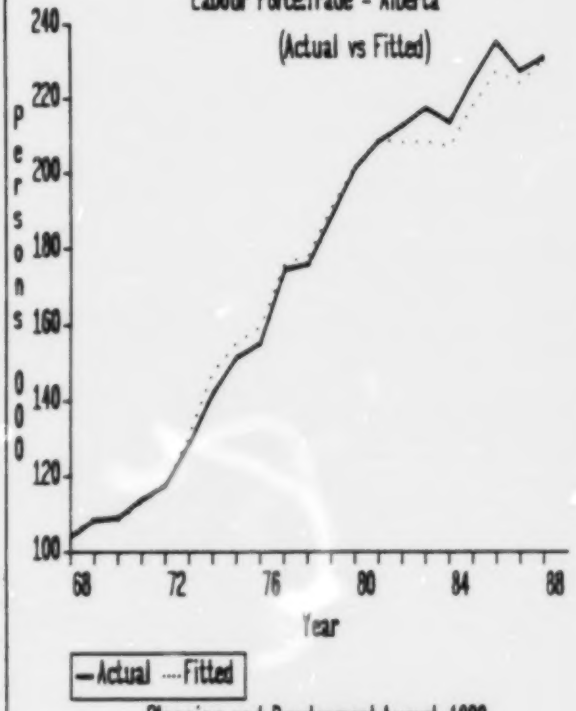

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Figure 12

Labour Force:Finance - Alberta

(Actual vs Fitted)

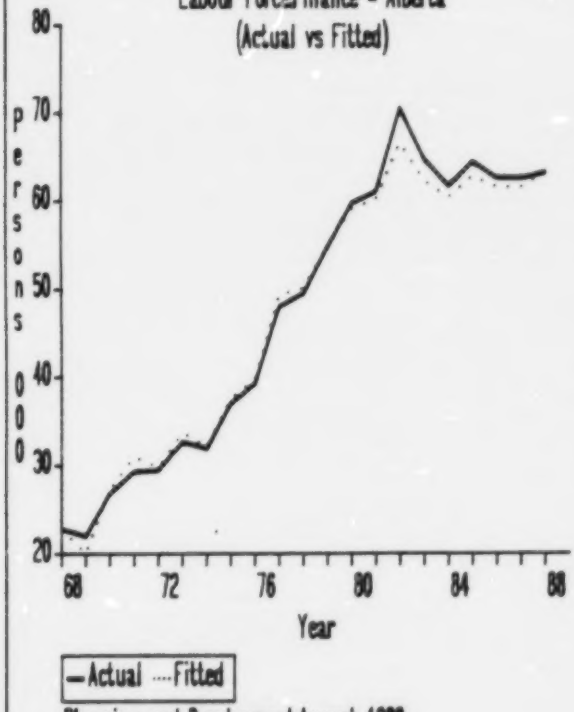

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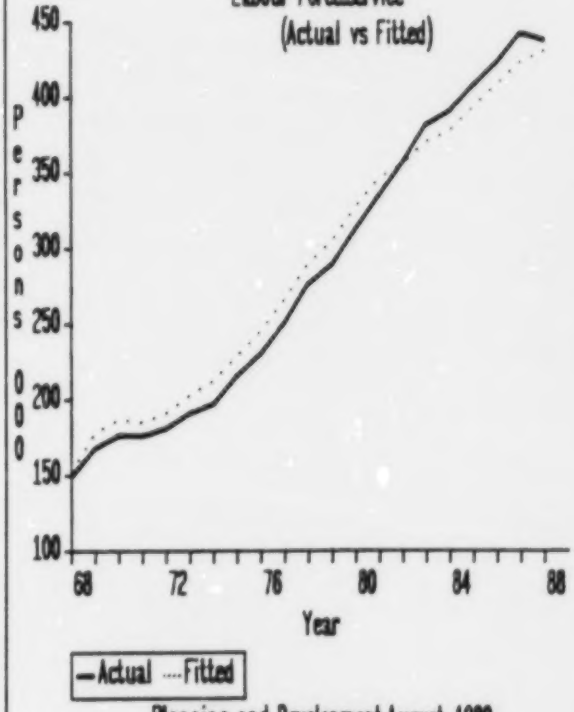
Figure 13

Labour Force:Service

(Actual vs Fitted)



Planning and Development,August 1989

The results are in keeping with prior expectations. The equations show that 99% of the variation in the dependent variable is explained by the independent variables.

The error terms are less than 10%. The largest deviations occur in 1969 and 1971 when the error terms were 9% and 5.9% respectively. The equation provides a reasonable estimate of the sample period (see Figure 9).

- **Transportation**

The labour force in the transportation industry is represented by the following equation:

LFTRANS = F (LFTRANSL, CHTRANS)

where:
LFTRANS = labour force in transportation
LFTRANSL = labour force in transportation lagged one period
CHTRANS = percentage change in transportation employment

The previous period's labour force is expected to have a positive effect on the current labour force. A change in employment is also expected to induce a similar change in the labour force.

The estimated form of the above equation is as follows:

LFTRANS = -1758.2 + 1.02 LFTRANSL + 792.65 CHTRANS
(-1.64) (81.34) (13.56)

R^2 = .99 D.W. = 2.1 S.E.E. = 1063.99 1967-1988

The results are in keeping with prior expectations. The equation shows that 99% of the variation in the dependent variable is explained by the independent variables.

The error terms are all less than 3%. The largest errors occur in 1983 and 1984 when the error terms were 2.50% and 2.79% respectively. The equation therefore provides a good estimate of the sample period (see Figure 10).

- **Trade**

The labour force in the trade industry is represented by:

LFTRADE = F(LFTRADEL, CHTRADE)

where:
LFTRADE = labour force in trade

LFTRADEL = labour force in trade lagged one period
CHTRADE = percentage change in trade employment

The previous period's labour force is expected to be positively correlated with the current labour force. Similarly, a positive increase in employment is expected to induce a positive increase in the labour force.

The estimated equation for the above relationship is as follows:

LFTRADE = -3557.10 + 1.02 LFTRADEL + 1460.77 CHTRADE
(-1.25) (68.69) (9.98)

R^2 = .9974 D.W. = 1.92 S.E.E. = 2539.91 RHO = .14 1967-1988

The results are in keeping with previous expectations. The equation shows that the independent variables together explain 99% of the variation in the dependent variable.

The error terms are all less than 4%. The largest errors occur in 1974 and 1986 when the estimated values were 3.9% and 3.3%. The equation therefore provides a good estimate of the sample period (see Figure 11).

- **Finance**

The labour force in the finance industry is represented as:

LFFIN = F (LFFINL, CHFIRE)

where:
LFFIN = labour force in finance
LFFINL = labour force in finance lagged one period
CHFIRE = percentage change in finance employment

LFFIN = -2578.08 + 1.04 LFFINL + 460.44 CHFIRE
(-3.08) (70.00) (11.37)

R^2 = .99 D.W. = -1.80 S.E.E. = 1307.58 RHO = -.34 1967-1968

The results are in keeping with prior expectations. The equations show that 99% of the variation in the dependent variable is explained by the independent variables.

The error terms are all less than 10%. The largest deviations occur in 1969 and 1971 when the error terms were 9% and 5.9% respectively. The equation provides a reasonable estimate of the sample period (see Figure 12).

- **Service**

The labour force in the service industry is estimated by the following equation:

LFSERV = F(LFSERVL, CHSERV)

where:
LFSERV = labour force in service
LFSERVL = labour force in service lagged one period
CHSERV = percentage change in service employment

The previous period's labour force is expected to induce a similar change in the current labour force. As a result, the sign on the regression coefficient is expected to be positive. In addition, a positive increase in employment is expected to produce a positive increase in the labour force.

Estimating the above equation yields the following results:

LFSERV = -5098.25 + 1.02 LFSERVL + 2270.07 CHSERV
(-.70) (48.42) (5.48)

R^2 = .99 D.W. = 1.60 S.E.E. = 5172.29 RHO 1967-1988

The results are in keeping with prior expectations. The equation shows that 99% of the variations in the dependent variable is explained by the independent variable.

The error terms are all less than 8%. The largest errors occur in 1974 when the deviation was 7.6%. The equation therefore provides an acceptable estimate of the sample period (see Figure 13).

- **Public Administration**

The labour force in public administration is represented by the following equation:

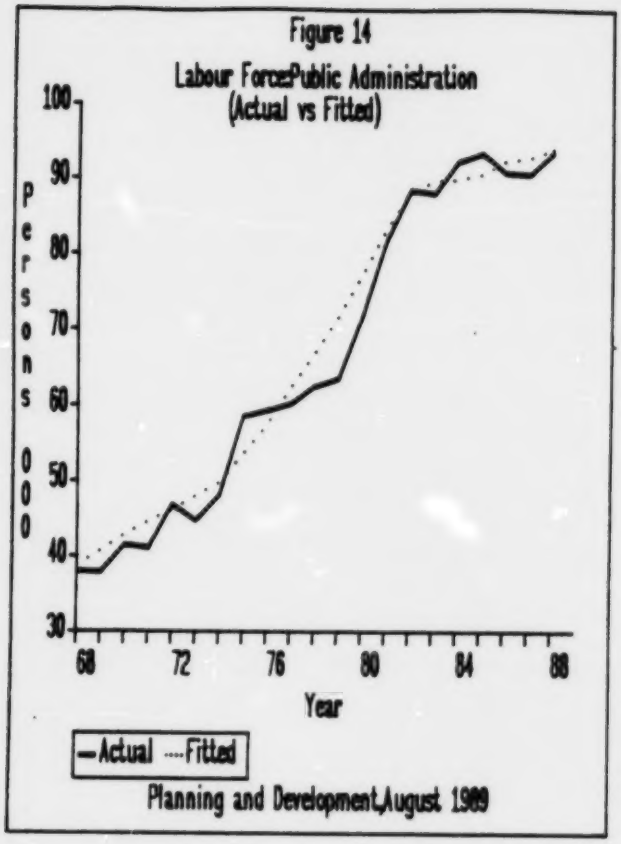
LFPUBAD = F(LFPUBADL, CHPOPA)

where:
LFPUBAD = labour force in public administration
LFPUBADL = labour force in public administration lagged one period
CHPOPA = percentage change in provincial population

LFPUBAD = -2128.80 + 1.20 LFPUBADL + 1392.46 CHPOPA
(-.66) (27.73) (2.44)

R^2 =.97 D.W. = 2.02 S.E.E. = 3430.80 RHO = -.09 1967-1988

Figure 14


Labour Force:Public Administration
(Actual vs Fitted)
Persons 000
100
90
80
70
60
50
40
30
68
72
76
80
84
88
Year
—Actual ----Fitted
Planning and Development,August 1989

The results are in keeping with previous expectations. The equation shows that the independent variables together explain 97% of the variation in the dependent variable.

Most of the error terms are less than 10%. The exception occurred in 1979 when the error term is estimated at 12.87%. The equation therefore provides an acceptable estimate of the sample period (see Figure 14).

5.2.2 Future Labour Supply

- **Agriculture**

The labour force in agriculture is expected to decline from its estimated value of 93,700 persons in 1988 to 91,300 persons in 1993 (see Table A7). The decline in the labour force will be caused by reduced employment opportunities in agriculture. For example, in 1991 and 1992 employment in agriculture is forecasted to grow by 0.2% and 0.4% respectively.

- **Resource**

The resource sector's labour force in 1988 and 1989 is estimated at 74,600 and 72,900 persons respectively and it is expected to drop to 72,500 persons by 1993. The decline in the labour force is largely explained by the lack of job opportunities over the forecast period 1989 to 1993 as employment is expected to grow in 1991 and 1992 by .2% and .2% respectively.

- **Manufacturing**

The manufacturing labour force is forecasted to grow from its estimated level of 105,800 persons in 1989 to 111,300 persons in 1993 or by 5.2%. The increase in the labour force, over the forecast period, will be induced by positive growth in the provincial population and increased employment opportunities in manufacturing.

- **Construction**

The labour force in the construction industry is projected to decline steadily from its 1989 estimate of 80,800 persons to 75,400 persons in 1993. This is a continuation of the trend that began in the 1981-1988 period when the labour force plummeted from 129,800 to 86,000 persons. The decline in the labour force over the 1989-1993 period should occur even though population and employment are increasing.

- **Transportation**

  The labour force in the transportation industry is forecasted to grow from 99,100 persons in 1989 to 100,700 persons in 1993, which is an increase of 1.6%. The growth in the labour force will be retarded by lack of job opportunities in the transportation industry.

- **Trade**

  The labour force in the trade industry is forecasted to grow from 234,800 to 247,200 persons between 1989 and 1993 or by 5.3%. The growth in the labour force over the forecast period will be hampered by lack of job opportunities in trade. Employment in this industry is expected to grow by 0.5% per year.

- **Finance**

  The finance industry's labour force is estimated at 63,000 and 66,600 persons in 1988 and 1989 and it is expected to increase to 69,700 persons by 1993 or 4.6%. Individuals will be distracted from the finance industry's labour force because of the unavailability of jobs.

- **Service**

  The service industry's labour force is estimated at 437,900 and 446,400 persons in 1988 and 1989 respectively and it is forecasted to climb to 481,700 persons by 1993 or by 7.9%. The growth in the service industry's labour force will be induced by the availability of jobs in the industry. Employment growth in the industry is expected to be positive throughout the forecast period. The forecast of continued growth in the industry's labour supply through 1989-1993 is a continuation of past trends.

- **Public Administration**

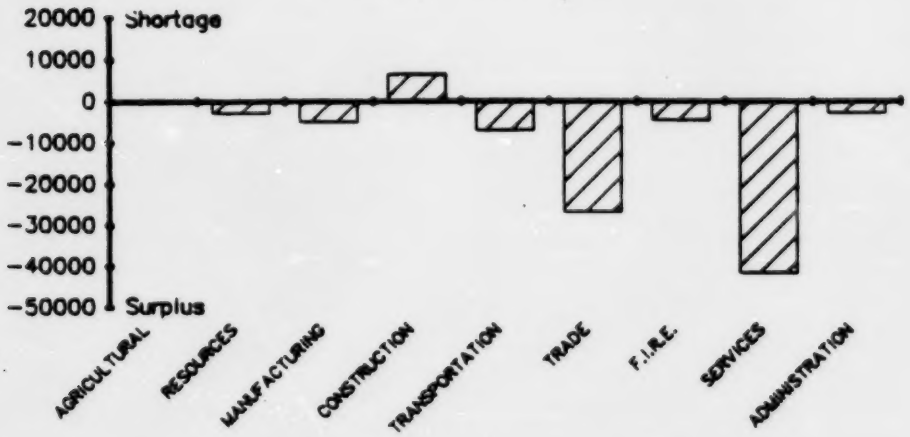
  The labour force in the service industry in 1988 and 1989 is estimated at 93,500 and 94,200 persons and by 1993 it is forecasted to grow to 99,900 persons or by 6.12%. The moderate growth in the labour force is due mainly to the assumption that the provincial population will grow at less than 1.0% per year throughout the forecast period.

5.3 Most Probable Projections - Shortage/Surplus

When the labour supply projections from the econometric analysis are combined with the labour demand projections, the future that emerges is one of expected shortages in construction and a delicate balance in agriculture, resources, manufacturing, public administration, and

Figure 15

LABOUR SHORTAGE AND SURPLUS: ALBERTA 1993



Source: The Planning and Development Department, August 1993.

finance (see Figure 15). The shortages in construction emerge gradually over the 1991 and 1992 period. The construction industry is expected to experience labour shortages of 6,700 person years by 1993 (see Table A7).

The agriculture industry is projected to experience a labour surplus of 300 person years. This industry is not a major employer and as a result, a small surplus can be regarded as a situation of near balance. The projected labour surplus in resources (1,800), manufacturing (5,000), public administration (2,900), and finance (4,700) is relatively small and as a consequence, greater growth in the economy could shift labour surplus into labour shortage by 1993. There are two implications of this potential shift from surplus to shortage. First, even if a surplus is maintained, shortages of specific occupations are likely to emerge, especially in manufacturing, where there are specialized skills. Second, the forecasted shortages result from the selection of the most probable labour demand forecast compared with the COPS/Conference Board forecasts. The conclusions regarding shortages/surplus are very sensitive to the selection of the demand forecast. Such sensitivity can be addressed, but not reduced, by a regular monitoring of labour demand/supply.

The service and trade industries are expected to have the largest surpluses at 41,700 and 26,900 person years respectively. The overall economy should experience a labour surplus of 83,800 person years by 1993; this is an estimated unemployment rate of 6.3%.

- **Agriculture**

  The labour supply/demand situation is expected to be roughly in balance by 1993. In 1989, the labour supply in agriculture is estimated at 91,900 persons and is expected to decline to 91,300 persons by 1993. The slow growth in the labour force will be induced by unfavourable employment opportunities in agriculture.

  In 1989, labour demand in agriculture is estimated at 90,900 jobs; while the labour supply is estimated at 91,900 persons. By 1993, labour demand inches to 91,000 jobs and labour supply falls to 91,300 persons. Over the review period the agriculture labour market is expected to be in a state of equilibrium.

- **Resource**

  The labour supply in the resource industry is forecasted to shrink by 400 persons over the 1989-1993 period. In 1989, it is estimated at 72,500 persons and by 1993 it is expected to drop to 72,500 persons. This forecast is based on the assumption that oil prices will remain relatively stable over the forecast period.

In 1989, labour demand in the resource industry is estimated at 68,000 jobs, while the labour supply is estimated at 72,900 persons. By 1993, labour demand is projected at 70,700 jobs and the labour force at 72,500 persons. As a result, the labour market is forecasted to remain in a position of equilibrium throughout the forecast period.

- **Manufacturing**

The manufacturing labour supply is projected to increase by 5,500 persons over the review period 1989 to 1993. In 1989, the labour supply is estimated at 105,800 and by 1993 it is forecasted to grow to 111,300 persons or by 5.2%.

Labour demand in manufacturing is expected to grow from 98,100 to 106,300 jobs between 1989 and 1993, which is less than the estimated and forecasted labour supply for 1989 and 1993. The labour market in manufacturing is forecasted to move from a position of relative labour surplus (7,700 persons) in 1989 to one of relative balance (5,000 persons) in 1993.

- **Construction**

The construction industry's labour supply is forecasted to fall from 80,800 to 75,300 persons between 1989 and 1993. This forecast represents a continuation of the trend that began over the 1981 - 1988 period when the labour supply plummeted from 129,000 to 86,000 persons respectively. Over this period, many construction workers left the province to seek employment elsewhere. The Construction Industry Advisory Council of Alberta (1988) reported that 9 to 10% of out-migrants were in construction trades and as a result, about 9,000 construction workers left the province of Alberta in 1986. If their estimate is correct, then about 2,500 construction people would have left the province in 1987. Another contributing factor in the shrinking labour force is the increasing rate of attrition caused by the aging of the construction labour force[14].

The labour market is expected to tighten in 1989 (8,800 person year) which is an improvement over the 1988 (13,000 persons years) excess supply position and by 1993 it is forecasted to be in a deficit situation (6,700 person years). In 1989, labour demand in the construction industry is estimated at 72,000 jobs which is less than the labour force of 80,800 persons. By 1993, labour demand is expected to increase to 82,000 jobs, while the labour supply is expected to drop to 75,300 persons. The labour market in the construction industry is expected to move from a position of labour surplus in 1989 to labour shortage in 1993.

This forecast of a growing shortage is supported by two independent sources. The Canadian Manufacturers Association (1988) in its June 1988 survey of its members found that

employers are experiencing difficulties in staffing certain construction related trades. The Canadian Federation of Independent Business in a recent survey of Alberta businesses found that 57% of respondents were having difficulties in recruiting workers (Edmonton Canada Employment Centres 1989).

- **Transportation**

The labour supply in the transportation industry is projected to increase from 99,100 to 100,700 persons from 1989 to 1993 respectively. The change in the labour force will be influenced by changes in employment in that industry.

Labour demand in the transportation industry in 1989 is estimated at 93,000 jobs, which is 6,100 persons less than the labour supply. By 1993, labour demand is expected to increase to 93,500 jobs, while the labour supply is forecasted to be 100,700 persons. As a result, the labour market is expected to worsen over the forecast period.

- **Trade**

The labour supply in the trade industry is projected to increase by 12,400 persons over the 1989 - 1993 period. This small increase in the labour force will be as a result of the lack of job opportunities in the trade industry.

The labour demand in this industry is estimated at 216,000 jobs in 1989 which is less than the labour supply of 234,800 persons. By 1993 labour demand is forecasted to climb to 220,300 jobs, while the labour supply is projected to increase to 247,200 persons. As a result, the labour surplus situation is expected to worsen over the 1988 - 1993 period.

- **Finance**

The labour supply in the finance industry is expected to increase by 3,100 persons over the 1989 -1993 period. This change will be mainly in response to changes in labour demand in the finance industry.

Labour demand in the finance industry is estimated at 63,500 jobs in 1989, which is less than the labour supply of 66,600 persons. In 1993, labour demand is projected to grow to 65,000, which is less than the labour supply of 69,700 persons. Over the review period, the labour market is expected to remain in a relative balance.

- **Service**

The labour supply in the service industry is projected to increase by 35,300 persons over the 1989 -1993 period. In 1989,

the labour supply is estimated at 446,400 persons and it is forecasted to grow to 481,700 persons by 1993. Growth in the labour supply is expected to be stimulated by increasing job opportunities in the service industry.

In 1989, labour demand in this industry is estimated at 416,000 jobs, which is less than the estimated labour supply of 446,400 persons. By 1993, the jobs gap is expected to increase as the labour supply climbs to 481,700 persons as opposed to 440,000 jobs.

The forecast for the service industry is for the labour surplus to worsen over the forecast period. The service industry covers a range of activities and as a result, shortages in same sectors may exist with surpluses in others. The service industry should therefore be closely monitored to identify surpluses/shortages various sectors.

- **Public Administration**

The labour supply in public administration is estimated to grow by 5,700 persons over the 1989 - 1993 period. The relative stagnation in the growth of the labour supply will be as a result of a lack of job opportunities in this industry.

In 1989, the labour demand is estimated at 93,000 jobs which is less than the labour supply of 94,200 persons. By 1993, labour demand is forecasted to grow to 97,000, which is less than the forecasted labour supply of 99,900 persons.

6. ISSUES

This section is devoted to a discussion on significant demand/supply factors and data limitations that contribute to forecast uncertainty.

6.1 Demand Factors

- **Development of Energy Projects**

  Several large scale energy projects are currently in the planning stages in Alberta. These projects as a group (or individually) have the capacity to significantly impact on the province's labour market in general and on the demand for specific occupations in particular. None of these have been incorporated into the current manpower forecast and as a consequence a decision to develop any one or all of them would require reviews of the forecast. The labour shortages anticipated in the resource extraction and construction industries would be much more severe.

- **Technological Change**

  The adaptation of advanced technology to the market place has enabled businesses to transmit and receive information very rapidly. For example: technology and capital can be shifted around the world by satellite. As a result, it becomes difficult for countries and regions to claim a comparative advantage in the production or delivery of certain services (Business Week 1989). Alberta's and Edmonton's ability to compete in the international market place would be fundamentally affected by the ease with which they can acquire and use new technology.

6.2 Supply Factors

- **Importance of In-Migration**

  In- and out-migration has played a significant role in the province's economic development. In the 1970's, when job prospects were good, there was a large influx of people to Alberta in search of employment. As the situation reversed itself in the 1980's, there was an outflow of people from Alberta to the rest of Canada in search of employment. As the 1990's approach and labour shortages appear in certain occupations, the question that must be asked is, "would in-migration be a factor in meeting labour market deficiencies?" The answer may be that migration may play a smaller role than in the past for two reasons. First, the rest of Canada (namely, Ontario and Quebec) may continue to enjoy economic growth and, as a consequence, it would be difficult to attract job seekers to Alberta. Second, people may be reluctant to move to Alberta because the province is perceived as a boom and bust economy. During the boom of the 1970's migrants to Alberta prospered, but as the bust replaced the boom, many people lost

their jobs and property. This memory is difficult to erase (see Hryciuk 1989).

- **Aging of the Labour Force**

  Alberta, like the rest of Canada, is experiencing the aging of its population. As a consequence, it would become difficult to staff entry level positions. This would have severe consequences for those industries that have a high proportion of young people in their operations, for example, the service industry. In addition, this phenomenon should have a negative effect on those industries that are expected to experience labour shortages.

- **Feminization of the Labour Force**

  A significant difference exists between male and female labour force participation rates in Edmonton; for example, in 1988 the male labour force participation rate was 80.5% while the female rate was 64.7%. On the basis of this disparity, it can be argued that women are under utilized in the economy. An increase in the female participation rate, assuming all things are equal, would lead to a closing of the gap and an increase in the total labour force. This would provide a partial solution to the problem of the aging of the labour force. This development, however, hinges on a number of social and economic factors.

7. CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

7.1.1 Emerging Forces

- The data for the province of Alberta shows that part-time employment's share of total employment increased from 13.1% in 1976 to 15.5% in 1988.

- As of May 1989, there were 59,400 persons employed as part-time workers in Edmonton. The majority of employees were in the 15-24 years category (26,300 jobs) and 25-44 years category (21,400 jobs), which accounted for 80.3% of all part-time employment. In addition, women comprised 72.4% of the total part-time workers.

- In the Edmonton labour market employment in the service industry increased from 110,000 jobs in 1981 to 125,900 jobs by 1986. All sectors of the service industry, with the exception of business services experienced employment gains. The strongest growth sectors were health and welfare services and personal services which grew from 26,000 to 32,500 and 22,900 to 28,600 jobs respectively over the 1981-1986 period.

- The job creation record of medium sized firms in Alberta over the 1978-1984 period has been dismal. Businesses with 20-49.9 and 50-99.9 employees lost on a net basis 3,000 and 1,200 employees. On the other hand, job creation among firms with 500 or more employees was relatively strong since job increases were achieved with a reduce number of firms. The majority of the increases in employment (55.3%) was attributed to businesses having less than five employees. Businesses with 5 to 19 employees created 10.2% of the net job increase.

- In the Edmonton area 87.5% of all establishments employ 28.3% of all employees. In contrast, 11.4% of all establishments employ 71.7% of all employees.

- The average age of the City of Edmonton's working age population is expected to increase from an estimated 33.9 years in 1976 to 36.5 years by 1993. This is expected to have a significant effect on the hiring practices of employers who have traditionally relied on young workers to staff entry level positions.

7.1.2 Future Labour Demand and Supply

- The most probable forecast indicates a significant labour demand increase over 1989 to 1993, with major gains in the service, manufacturing and construction industries.

- Labour supply will tighten in the resource and construction industries, with generalized shortages becoming apparent in 1990 in the construction industry.

- The service industry is expected to be the major source of employment for the working age population. For example, 44.3% of the new jobs that will be created between 1989 and 1993 will be in the service industry.

- There are significant differences in the Alberta labour demand forecasts prepared by COPS and the Conference Board for manufacturing, construction, transportation, trade, finance, services and public administration. The differences are important especially at the industry division level because a selection of one set of forecasts versus the other will determine the study's findings regarding labour demand and supply. The magnitude of the differences underscores the uncertainty of forecasting economic activity in Alberta over the medium term.

7.2 Recommendations

- One of the principal limitations of the study is that data on the geographic distribution of employment in Alberta is not readily available. The distribution of employment between Edmonton and the rest of Alberta was achieved by using ratios derived from the 1981 and 1986 federal census. The use of fixed 1986 ratios does not allow for the progressive structural shifts that Edmonton and the province will experience during the study period.

  It is recommended that the data gathering and dissemination agencies be asked to provide information on employment for Census Metropolitan Areas below the industry division level.

- The report should be distributed to those industries, groups and government agencies involved in training and programming needs for manpower planning.

- Manpower surveys are necessary in those industries that are expected to experience labour shortages and the service industry; such surveys should meet the following objectives:

  (1) To examine the extent to which companies in Alberta are currently experiencing problems in hiring skilled workers to fill positions in major occupational categories.

(ii) To assess how the labour market conditions will change over the next five years.

(iii) To assess opportunities to mitigate skilled labour shortages through training programs.

- The labour market should be monitored on a regular basis to identify emerging trends.

NOTES

Section 1

1. Labour demand is defined as the sum of employment plus vacancies.

2. Labour supply is defined as the sum of employment plus unemployment.

3. See discussion in Economic Council of Canada, Western Transition, Ottawa 1984.

4. The Alberta economy is heavily dependent on energy resources. In 1983, the resource industry accounted for 24% of Alberta's Gross Domestic Product. City of Edmonton, Edmonton Economic Base Analysis, July 1985.

5. See discussion in Hudson Institute, Workforce 2000, U.S. Department of Labour, Washington, D.C., June 1987.

Section 2

6. See statistics in table 5 of this report. In 1986, Alberta and Edmonton had employed labour forces of 1,166,485 and 359,090 persons respectively.

7. The evidence for the United States is presented in Bluestone, B. and B. Harrison, The Deindustrialization of America, New York: Basic Books, 1982.

8. The average annual employment per establishment was calculated by dividing the establishment's annual total payroll by the average annual earnings per employee.

9. Information on business growth in Edmonton is presented in Hingston, A., Business Growth in Edmonton 1988. Research Paper No. 29, City of Edmonton Planning and Development, April 1989.

Section 3

10. The methodology for preparing labour demand for the Canadian economy is described in The Canadian Occupational Projection System: Demand Methodology, Ottawa, January 1983.

11. The ratio method is sometimes referred to as the fixed coefficient method. A discussion of the fixed coefficient method is provided in Employment and Immigration Canada, Canadian Occupational Projection System: Demand Methodology, January 1983.

Section 4

12. All labour demand projections for Edmonton are derived by the ratio method. A discussion of the methodology is given in Section 3.

Section 5

13. A most probable forecast for occupations was not prepared because an industry/occupation matrix for Edmonton is not readily available.

14. See Hryciuk, D. Edmonton Journal, "Labour Force Crunch Hurting Alberta Firms", Edmonton, June 29, 1988.

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APPENDIX

LIST OF TABLES

A1 = Labour Demand - Alberta (COPS)
A2 = Labour Demand - Alberta (COPS)
A3 = Labour Demand - Edmonton (Using COPS - Alberta)
A4 = Labour Demand - Edmonton (Using COPS - Alberta)
A5 = Labour Demand - Alberta (Conference Board)
A6 = Labour Demand - Edmonton (Using Conference Board - Alberta)
A7 = Labour Marekt - Alberta (Supply/Demand Balance)

TABLE A1

Labour Demand - Alberta
(COPS)

Occupations	1988	1989	1993	Growth 1993-1989	Growth (%CH)
Managerial	131,000	133,000	134,800	1,800	1.35
Natural Science	54,400	54,700	55,200	500	0.91
Social Science	22,400	22,700	23,000	300	1.32
Teaching	52,100	51,800	52,400	600	1.16
Medicine	61,700	61,900	62,800	900	1.45
Artistic	16,500	16,800	17,400	600	3.57
Clerical	227,800	231,000	233,500	2,500	1.08
Sales	119,300	122,300	124,700	2,400	1.98
Service	138,100	140,500	145,400	4,900	3.46
Farming	83,200	89,300	91,500	2,200	2.46
Fishing	300	300	300	0	0.00
Mining	12,500	12,600	12,700	100	0.79
Processing	21,500	21,800	22,000	200	0.92
Product Fabrication	1,400	1,400	1,500	100	7.14
Repair	58,900	59,700	60,400	700	1.17
Construction	77,100	75,700	75,100	(600)	-0.79
Transportation	42,700	43,200	44,100	900	2.08
Material Handling	13,700	13,800	14,000	200	1.45
Other Equipment Op	11,800	11,900	11,900	0	0.00
Other	43,700	44,200	45,000	800	1.81
TOTAL	1,189,900	1,208,400	1,227,600	19,200	1.59

Source: Canadian Occupational Projection System (COPS)
Employment and Immigration, January 1989

TABLE A2

Labour Demand - Alberta
(COPS)

Industry Division	1988	1989	1993	Growth 1993-1989	Growth (%CH)
Agricultural	85,700	92,800	95,400	2,600	2.80
Resources	73,000	72,700	73,100	400	0.55
Manufacturing	91,400	92,500	93,800	1,300	1.41
Construction	83,200	80,700	80,000	(700)	-0.87
Transportation	55,400	55,800	56,400	600	1.08
Communication	27,500	27,400	26,100	(1,300)	-4.74
Utilities	10,200	10,200	10,200	0	0.00
Retail Trade	153,900	159,200	163,500	4,300	2.70
Wholesale Trade	60,500	60,800	61,000	200	0.33
Finance	62,100	63,400	63,400	0	0.00
Education Services	88,900	88,100	89,200	1,100	1.25
Health & Welfare Services	99,200	99,200	100,600	1,400	1.41
Amusement & Recreation	4,300	4,300	4,300	0	0.00
Business Services	67,700	68,100	69,200	1,100	1.62
Personal Services	28,900	29,100	29,800	700	2.41
Miscellaneous Services	113,800	117,000	124,900	7,900	6.75
Public Administration	84,200	87,000	87,000	0	0.00
TOTAL	1,189,900	1,208,400	1,227,600	19,200	1.59

Source: Canadian Occupational Projection System (COPS)
Employment and Immigration, January 1989

TABLE A3

Labour Demand - Edmonton
(Using COPS - Alberta)

Occupations	1988	1989	1993	Growth 1993-1989	Growth (%CH)
Managerial	42,300	43,000	43,600	600	1.40
Natural Science	16,600	16,700	16,900	200	1.20
Social Science	7,900	8,000	8,100	100	1.25
Teaching	16,700	16,600	16,800	200	1.20
Medicine	22,200	22,300	22,600	300	1.35
Artistic	6,100	6,200	6,400	200	3.23
Clerical	77,800	78,900	79,700	800	1.01
Sales	39,400	40,400	41,200	800	1.98
Service	42,600	43,400	44,900	1,500	3.46
Farming	5,900	6,300	6,400	100	1.59
Fishing	100	100	100	0	0.00
Mining	900	900	900	0	0.00
Processing	6,700	6,800	6,900	100	1.47
Product Fabrication	500	500	500	0	0.00
Repair	20,800	21,100	21,400	300	1.42
Construction	21,000	20,600	20,500	(100)	-0.49
Transportation	12,200	12,400	12,600	200	1.61
Material Handling	3,900	4,000	4,000	0	0.00
Other Equipment Op	3,400	3,400	3,400	0	0.00
Other	13,800	14,000	14,200	200	1.43
TOTAL	360,900	365,500	371,100	5,600	1.53

Source: Planning and Development Department, August 1989

TABLE A4

Labour Demand - Edmonton
(Using COPS - Alberta)

Industry Division	1988	1989	1993	1993-1989 Growth (CH)	1993-1989 Growth (%CH)
Agriculture	4,900	5,300	5,400	100	1.89
Resources	6,800	6,700	6,800	100	1.49
Manufacturing	37,200	37,700	38,200	500	8.36
Construction	24,800	24,000	23,800	(200)	-0.83
Transportation	17,400	17,500	17,700	200	1.14
Communication	11,600	11,500	11,000	(500)	-4.35
Utilities	3,200	3,200	3,200	0	0.00
Retail Trade	45,300	46,900	48,100	1,200	2.58
Wholesale Trade	18,500	18,600	18,600	0	0.00
Finance	21,300	21,700	21,700	0	0.00
Education Services	29,400	29,100	29,500	400	1.37
Health & Welfare Services	34,200	34,200	34,700	500	1.46
Amusement & Recreation	1,500	1,500	1,500	0	0.00
Business Services	21,700	21,900	22,200	300	1.37
Personal Services	8,900	9,000	9,200	200	2.22
Miscellaneous Services	39,800	40,900	43,600	2,700	6.60
Public Administration	34,300	35,400	35,400	0	0.00
TOTAL	360,800	365,200	370,800	5,600	1.53

Source: Planning and Development Department, August 1989

TABLE A5

Labour Demand - Alberta
(Conference Board)

Industry Division	1988	1989	1993	1993-1989 Growth (CH)	1993-1989 Growth (%CH)
Agriculture	91,500	94,500	93,700	(800)	-0.85
Resources	68,800	70,800	69,500	(1,300)	-1.84
Manufacturing	94,700	98,100	106,300	8,200	8.36
Construction	73,500	74,800	82,000	7,200	9.63
Transportation	93,100	95,500	108,600	13,100	13.72
Trade	214,300	219,100	249,300	30,200	13.78
Finance	59,900	62,300	68,500	6,200	9.95
Services	402,200	408,600	452,500	43,900	10.74
Public Administration	87,900	91,900	97,100	5,200	5.66
Other					
TOTAL	1,185,900	1,215,600	1,327,500	111,900	9.21

Source: Conference Board of Canada, PC Alberta, Spring 1989

TABLE A6

Labour Demand - Edmonton
(Using Conference Board - Alberta)

Industry Division	1988	1989	1993	1993-1989 Growth (CH)	1993-1989 Growth (%CH)
Agriculture	5,200	5,300	5,300	0	-0.85
Resources	15,500	16,000	15,700	(300)	-1.84
Manufacturing	26,800	27,700	30,000	2,300	8.36
Construction	21,900	22,300	24,400	2,100	9.63
Transportation	31,700	32,500	37,000	4,500	13.72
Trade	71,100	72,700	82,700	10,000	13.78
Finance	20,500	21,400	23,500	2,100	9.95
Services	132,700	134,800	149,300	14,500	10.74
Public Administration	35,800	37,400	39,600	2,200	5.66
Other					
TOTAL	361,200	370,100	407,400	37,300	10.09

Source: Planning and Development Department, August 1989

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